

**HUGE
ISSUE!**

LOSI'S SMOKIN' JUNIOR T

Radio Control **CAR ACTION**

THE WORLD'S PREMIER R/C CAR MAGAZINE

December 1991

CRASH & BURN
WORLD CHAMPS Lett and
Hirosaka clean up!



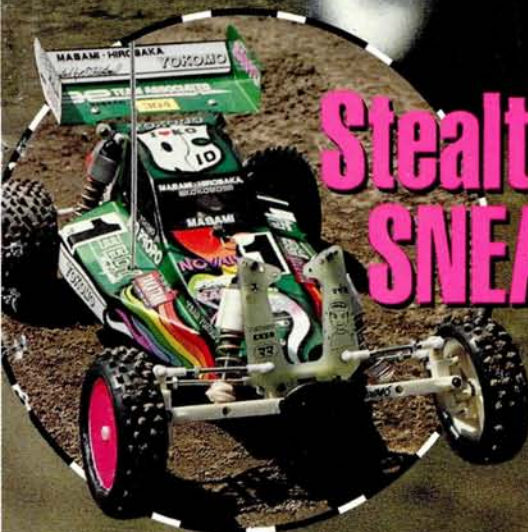
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VOLUME 6, NUMBER 12 DECEMBER 1991

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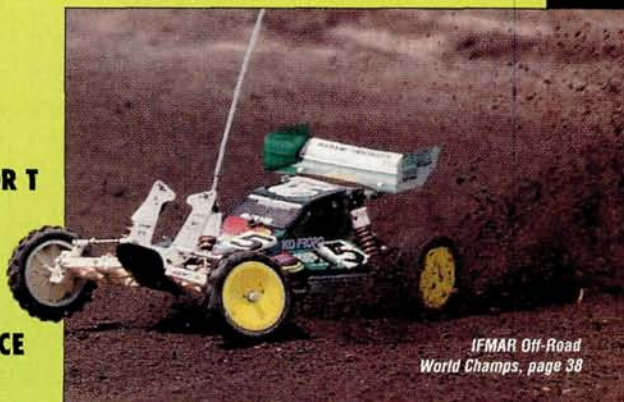
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EDITORIAL

GUEST EDITORIAL BY FRANK MASI



SUCCESS AND SPORTSMANSHIP

AS I GROW OLDER, I notice things that I might once have overlooked. I've observed a trend lately (lately to me, anyway) that disturbs me a little: people have been getting way too upset at R/C car races.

I'm not going to pretend that R/C racing is a relaxing hobby. If you're a serious racer, it can be stressful, time-consuming and expensive. It's a sport, and all the emotions that arise in any competitive endeavor—anger, joy, jealousy, even hate—rear their heads at R/C races, too. This is natural but, when these emotions get the better of people, they can severely inhibit everyone's enjoyment. I've seen tempers go far beyond flaring; I've seen cars, radios and even turn marshals thrown (well, maybe not turn marshals!).

I recently attended a ROAR regional championship at which a fistfight broke out. One driver thought that another driver had "hammered" his car too severely and this was what prevented him from making the A-Main. Both parties were "adults," and they should have known better. I commend the race director for quickly disqualifying both offenders.

My point is this: keep things in perspective. If your car crashes or breaks down during a race, be honest with yourself; it's probably nobody's fault but your own, so don't blame the marshals or the other drivers. Even if another car consistently punts you off the track, remember that it takes two to tango. Be the better driver; analyze the situation and formulate a strategy for avoiding this hazard just as you avoid obstacles on the track. I realize that it's often next to impossible to avoid a car that's swerving violently, but if you keep your wits about you, I guarantee that you'll come out on top.

If the pros can keep their cool at national and world-class events, then there's no reason for you to lose yours over a \$4 trophy at a local event. Give yourself a break!

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LETTERS

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Letters," Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

FYI HONDA/ACURA

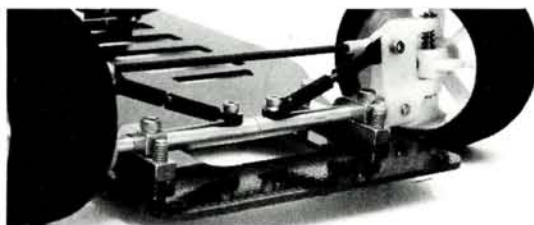
Many of you may recall a segment of Chris Chianelli's September '91 "Inside Scoop" about Yokomo's new 1/10-scale Honda NSX. Well, apparently there has been some confusion among our readers as to whether the NSX is a Honda or an Acura. The truth is, it's both. The name "Acura" is fictitious. Acura is a division of Honda Motors that was essentially

created to sell Honda's higher-priced cars in a market where consumers associate Honda with economy cars. It was believed that this market would have a difficult time shelling out thirty-grand-plus for a Honda. What market is that? You got it! The good ol' US of A is the only country where Acura exists. It's all marketing, my friends. Everywhere else in the world, NSXs, as well as Legends, Integras and the new Vigors are *Hondas*. FM

WHAT A GAS!

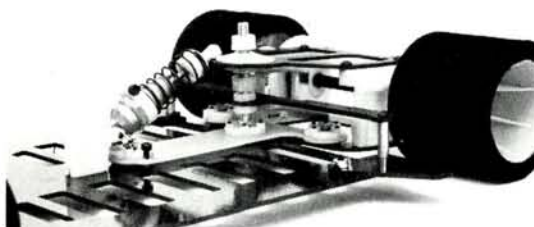
I've been reading your magazine for five months now, and I've decided to subscribe. I need some advice. I want to buy a gas car, maybe a Kyosho Rampage. I've noticed that there aren't very many gas

cars reviewed in your magazine. Is that because there aren't many gas cars? I've never owned an R/C car, though I did put a 4WD Tamiya together a little while back for my cousin. I think it's my turn to burn some rubber! Will you review more gas cars in the future? I plan to use a Futaba Magnum Sport or Jr. for the Rampage. Is that all right, or will I need a different radio? Overall, how is the Rampage? Is it a good choice for a first-time gasser? What else will I need beside an engine, fuel and a little patience? (C'mon, a gas car can't be that hard to deal with if you take care of the engine, right?) Tell me if I'm headed in the right direction. I don't plan to race. (I bet they all say that!) Let's just say that I want to drive in ways that I



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wouldn't in my real car. Any advice would be of great help.

JOHN SZETO
Chicago, IL

John we'll review more gas cars in the future. Reviews of the Mugen Super Sport and the Schumacher Nitro 10 are in the works. Yes, the Magnum Sport would be fine for a gas car, and yes, the Rampage is a good car to start with. You'll be able to learn about all the little adjustments that glow engines involve, without the expense of a larger 1/8-scale car and engine. You'll need a field box, a fuel pump, a Ni-Cd glow battery, glow plugs and, most of all, patience. Gas cars aren't that difficult to deal with, as long as you don't abuse them

by running them over-lean. (Although this will give your engine more power than a rich setting, it will be more likely to overheat and destroy itself.) Now, go burn some rubber!
JH

CONNECTED CONNECTOR

I own an RC10 with a Tony Neisinger motor; I have a Futaba MC112B speed controller, and the car is powered by a Sanyo Cadnica 1400mAh battery. The trouble is that the connection between my battery and speed controller gets extremely hot and even melts. Can you tell me what to do to reduce the heat? Could I use a different type of connector? If so, please tell me who makes it and how I can get it.

Do you think I have too much motor for my car?

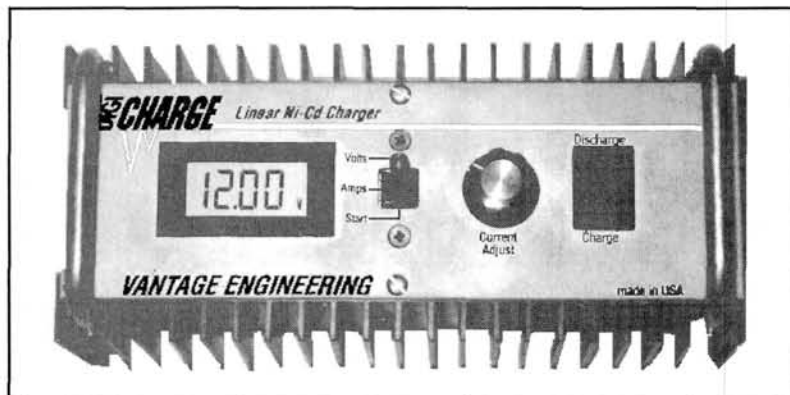
JOEY KNIGHT
Monroe, LA

Hey, Joe, that's exactly the same setup as the one that I used to run in my RC10! Your melting-connector problem stems from the connectors themselves. Try a set of Litespeed or Sermos connectors, and your problems will be over. They're available at any good hobby shop. Is a Tony Neisinger too much for your car? I don't think so. It's a 14-quad motor, and it's perfect for the RC10, but it's probably too much for the ESC. If the 112B gets exceptionally hot during a run, try a bet-

(Continued on page 10)



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LETTERS

ter unit, like a Tekin or a Novak. Both companies sell budget-priced models that can easily handle the Neisinger motor. JH

TIME TO MOVE ON

I have a used Tamiya Grasshopper. As I was looking through the July '91 issue, I saw some very nice trucks. The three that really caught my eye were the Schumacher Shotgun, the Losi Junior T and the Tamiya Hi-Lux. I've only been racing for a couple of months, but I'm ready to dump my Grasshopper. Here are three questions I'd really like answered by someone who knows what he's talking about:

1. Are these trucks too much for a beginner like me?
2. Which of the three would be the best? (I want one that's easy to get replacement parts for; that will be good for just playing around; but that, if I want to compete, will give me competition power.)
3. Will my Futaba radio system work in all of these trucks?

JOSHUA HOPKINS
Rockford, IL

All the trucks you mention are excellent, Joshua. I'd say that the Tamiya Hi-Lux is the most suitable for beginners, mainly because it's the only one that comes with a speed controller, so that's one less extra thing you'd have to buy. They're all good for racing, but as your driving skills progress, the Junior T and the Shotgun (which are based on 2WD off-road race cars) will have performance advantages. Your Futaba radio system should work without a hitch in any of the trucks. FM

ESC ENIGMA

I'm confused, and I hope you can help me. I have a new Junior Two. My dad helped me put it together (he did most of the work). I don't know which electronic speed controller to buy. I don't have much money to spend, and I'd like to race next season at my local track. Also, what's a good stock motor to use with the Junior Two?

BLAKE McALLISTER
Sound Beach, NY

Blake, any ESC will work well with a stock motor, but I recommend that you try a high-frequency ESC such as the Novak 410M5 or the Tekin 408S. High-frequency ESCs reduce motor arcing and prolong the motor's life. Concerning a stock motor, all 1991 stock motors are limited to 24 degrees of timing for ROAR-sanctioned races. I recommend that you go to a few races, see which motors are doing well by your standards and then decide which motor to buy. JH

HOLY HORSEPOWER, BATMAN!

I recently bought a Junior T, and I use a Tekin 411P high-frequency speed controller with it. Is it considered a competitive truck? Would it be OK to put a Triad 9-turn 50,000rpm motor in it, too? Totally rad mag. Keep up the good work.

ANTHONY TRUPIA
Bayside, NY

Well, Anthony, for the money, you can't get a much better truck than the Junior T, and the 411P is a good speed controller for it. The Triad motor would be a great...wait a minute...a Triad 9-turn motor?!?! That would be like putting a Chrysler 440 six-pack engine into a Volkswagen Rabbit with four space-saver spare tires on it! Not that the Junior T can't take it, but it would be pushed to its limit. The truck would be almost "undriveable," since giving it any throttle would break the rear end loose. Stick to a 16- to 21-turn motor for the truck. With the proper gearing, you'll be able to go almost as fast as you would with the 9-turn motor, but you'll get lots more run time. AS

WARP SPEED, SCOTTY!

I wish you could do a "Time Warp" or something like that on a Tamiya Wild Willys. That's something I'd like to read about.

TOM WILSON
Brightwater, NY

A "Time Warp" on the Wild Willys is a great idea, Tom, but there's one problem: as I'm sure you know, Tamiya doesn't make them anymore. To be featured in "Time Warp," a car must be unaltered and in its original box. So, Tom, if you or anyone out there has an unbuilt Wild Willys, or any other vintage car kit, drop us a line here at Car Action, and we'll do a "Warp" on it. FM

OUTLAWED?

I've noticed that, in every big R/C truck race, no one ever races an Outlaw Ultima. I own one and I think it's great, but why can't it compete against JR-XTs and RC10Ts? When I bought my truck several months ago, I didn't have the large amount of money needed to buy a JRX-T or a Blue Eagle. Since then, I've added a Novak 410-M5 ESC, a Trinity Monster Jam motor and a full set of bearings. It seems to be just as good as the JR-XTs at my track, so what gives at the large races?

ETHAN GILBERT
Detroit, MI

You can rest assured, Ethan, that there's absolutely nothing wrong with your Outlaw racing truck. If there's a reason they're scarcely seen at big truck races, I'd hazard to say it's because Kyosho isn't focusing much effort on it. Instead, I think that Kyosho is concentrating on its newest 2WD car, the Triumph, which will probably also be released as a truck soon. With full ball bearings and a ball differential, your Outlaw Ultima is capable of competing against any of the race trucks you mentioned. FM

ARE YOU LISTENING, ESPN?

I'm really into R/C cars. I own a Traxxas Blue Eagle and I love it. I like to watch R/C races, but I don't get a chance to do so very often, because there isn't a track nearby. I think it would be great if you could televise races on ESPN, like, once a week, or something. All of my friends

(Continued on page 219)

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TECH TIPS

Illustrations
by Jim Newman

This "Tech Tips" feature emphasizes R/C car maintenance. This is one of the most important yet most often neglected aspects of R/C racing, so we've assembled this array of tips to help you keep your car in tip-top condition. As usual, veteran artist Jim Newman's illustrations "bring the tips to life." So read on, and get out your screwdrivers!



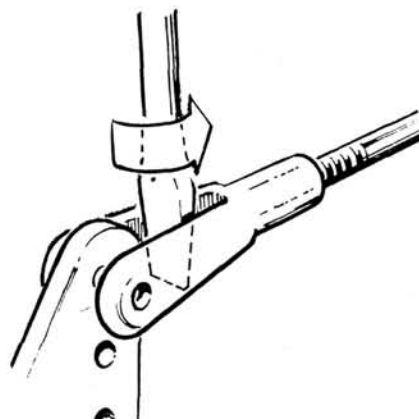
LATCH REPAIR

Try this if the battery-cover latch of your Hornet pops open at the slightest provocation because the latch is worn and bent back through constant use. Remove the hatch and hold the inside face of the latch over a small flame, gently bending it forward as the plastic softens. When the plastic has cooled, it will be back in alignment with the rest of the cover and as good as new.



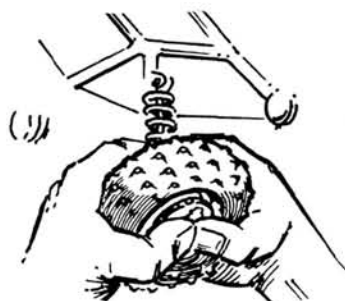
REFURBISH PLIERS

Worn teeth on pliers can be refurbished to some extent by using the Dremel Cut-Off wheel in the Moto Tool.



CLEVIS OPENER

Metal or nylon clevises pop open easily with a twist of a small screwdriver.



REAR WHEEL REMOVAL

Removing the rear wheels of dune buggies (e.g., the Tamiya Rough Rider) can be a little tough on the thumbs. Put a coin—a quarter works well—on top of the axle. Apply your thumbs to the coin, and the wheel pops off—no pain!



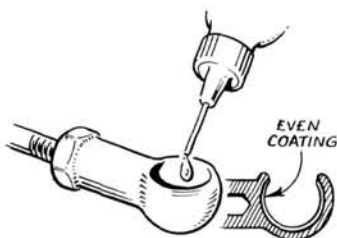
HIGH-PRESSURE AIR SOURCE

A high-pressure air source is very useful at your pit counter. It's great for blowing dirt out of your car. You can buy inexpensive, empty, Freon containers from your local air-conditioning man and conversion kits of a gauge, hose, relief valve, etc., from auto-parts stores. When converted, you can charge the portable air bottle at a local service station if you don't own a compressor.



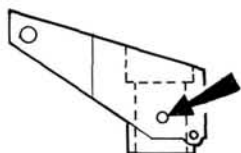
ORGANIZED WRENCHES

To speed up maintenance and pit work, change all the screws on your car to the Allen-head variety. Using a Q-Tip, color-code them—one color for each size. Then color-code each size of Allen wrench to match, and eliminate all the fumbling for the correct-size wrench.



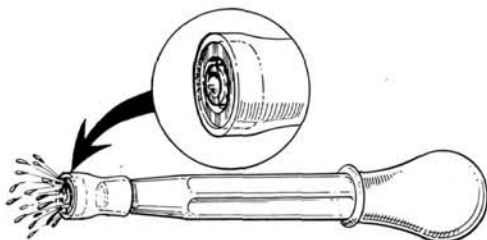
BALL-LINK REJUVENATION

If your car's ball links have slackened, temporarily tighten them by popping the ball link apart and dropping a spot of CA into the socket. Rotate the socket so that the inside is evenly coated with CA, then tap the link so that the excess runs out. (Wear eye protection for this job.) When the CA has cured, snap the ball back into the socket. Repeat the process until the ball joint is tight.



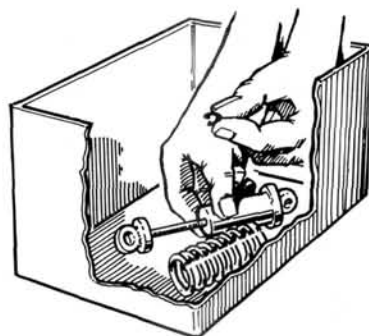
RC10 BEARING CLEANING

To make cleaning easier, drill a $\frac{3}{32}$ -inch hole through the side of the rear hub carrier (arrowed). Insert the nozzle of a pressure can into the hole, and blast dirt out of the bearing in the opposite direction from which it entered. Then spray your favorite lube into the hole, and seal it with tape or a "plug" cut from a toothpick.



HIGH-PRESSURE BEARING CLEANER

Push a piece of surgical-rubber tube over the end of a turkey baster, fill the baster with mineral spirits, and force a bearing into the tube. Squeeze the bulb and blast out the dirt!



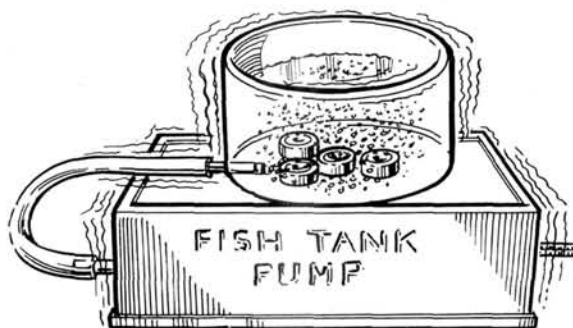
CAPTIVE C-RINGS

To prevent C-rings from catapulting away and being lost while you try to install them on the shock units, work with your hands and the shock units inside a large cardboard box. If the C-rings jump off, they'll just bounce off the inside of the box and stay there.



PARTS-CLEANER BASKET

Save that old coffee scoop, and drill lots of holes in it. Put small parts inside the scoop to wash them, and they won't get flushed down the drain. Polyethylene scoops are better than polystyrene ones, because chemical solvents don't dissolve polyethylene.



BUBBLING BEARING CLEANER

Here's an ingenious bearing cleaner. Immerse your dirty bearings in a suitable container of solvent, and attach it to a fish-tank pump. The air bubbles will agitate the cleaning solution, and the bearings will literally have the dirt shaken out of them!

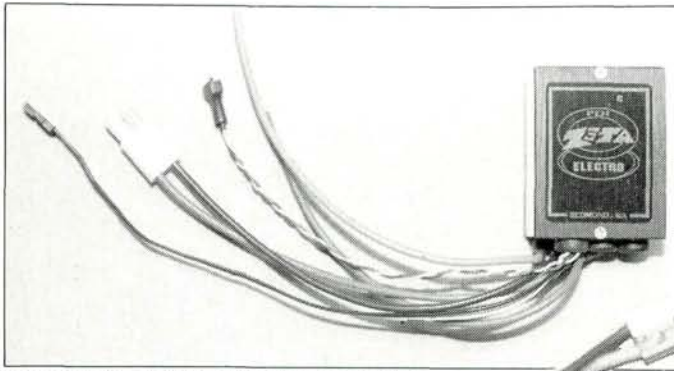
TRUCK STOP

by DAVE SPROUL

Power pulling!

THIS MONTH, I have three new products to tell you about, so let's get on with the show! First is Sassy Chassis'* new, two-piece rear axle for the Clod Buster. Built to withstand the rigors of R/C pulling competitions, this axle uses either stock or after-market gears and/or diffs. There are no dogbone joints on this axle, so you can't steer the rear wheels. If you've broken your stock axles while you

cases, automatic thermal shutdown, a full-speed indicator, an on/off switch and Zeta's exclusive Megatron transistor technology. Both speed controllers operate on six to 16 cells, and the difference between the two is their amp rating. The Silver version is rated at 180 amps continuous with a 600A surge capacity, and the Gold version is higher at 360 amps continuous with a 1200A surge. Both controls feature a "forward only" function, so they're well-suited to truck pulling. These reasonably priced speed controllers should be very popular.



The new Zeta Electro Series speed controllers are designed for truck pulling.

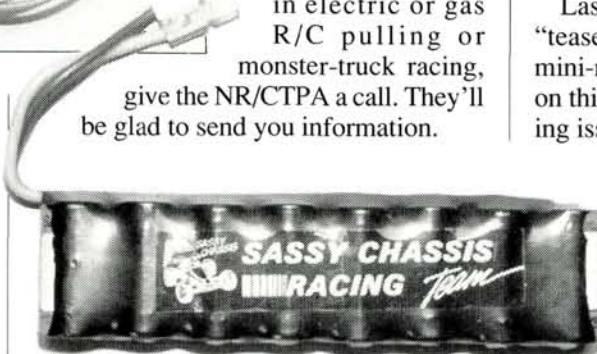
were pulling with your Clod, then this rear axle is for you! Also from Sassy Chassis are SCR Punch Paks, which you can buy as single cells or have them made to your specifications. These cells are matched for maximum voltage output.

Last time, I told you about PDI's* new Zeta Electro Series speed controllers. I've since received a sample of the Electro Gold that displays all the high-quality features for which the Zetas are famous. Most of you are probably familiar with these speed controllers, but perhaps you're intimidated by their seemingly complicated programming requirements. Well, the Electro Series changes all that. Adjustments have been simplified to neutral and full-speed only, and they don't require a separate programmer. Both the Silver and Gold versions feature machined-aluminum, watertight

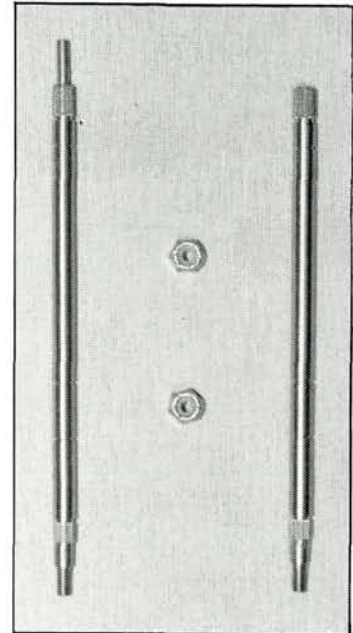
NR/CTPA MOVES

The National Radio Control Truck Pulling Association (NR/CTPA) has a new address: NR/CTPA, P.O. Box 894, Waukesha, WI 53187. Phone: (414) 542-2664.

If you're interested in electric or gas R/C pulling or monster-truck racing, give the NR/CTPA a call. They'll be glad to send you information.



Sassy Chassis' Punch Paks are ideal for pulling or monster truck racing.



Sassy Chassis' new, two-piece steel axles fit the Clod Buster using either stock or after-market gears.

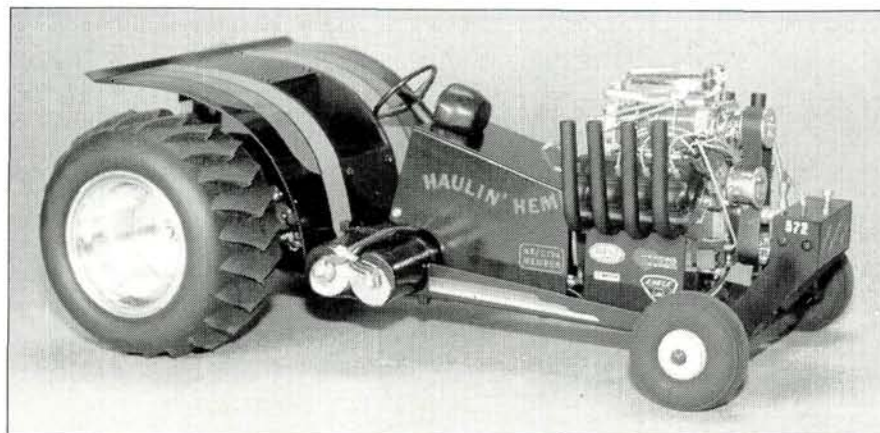
Last, but not least, I've included a "teaser" photo of my "Haulin' Hemi" mini-rod tractor. Watch for a full feature on this radical scratch-built in an upcoming issue.

Next time, I'll review the new JPS all-aluminum gearbox for Clod Busters. Stay tuned!

*Here are the addresses of the companies mentioned in this article:

Sassy Chassis, 906 Ridgewood Dr., Cary, IL 60013.

PDI, 169 NE 124 St., Redmond, WA 98052.



Watch for a feature article in Car Action on the incredibly detailed Haulin' Hemi Mini-Rod Tractor.

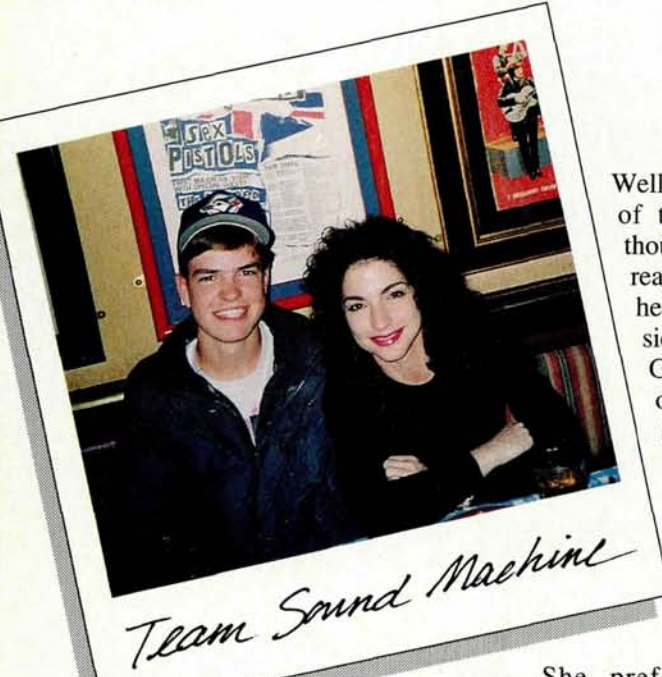
PHOTOS BY DAVE SPROUL

INSIDE SCOOP



by CHRIS CHIANELLI

As directed by the Ayatollah of Radio Controlla, Commander Crash Chianelli reporting back to the faithful followers of the Grand High Exalted with pertinent information! I'm back from my latest espionage excursion with microfilm, spy shots and stolen communiques that read as follows:



Team Sound Machine

Well, the cat's out of the bag! Although she's not ready to give up her brilliant music career, singer Gloria Estefan of Miami Sound Machine has serious aspirations of becoming a world-class R/C race-car driver.

She prefers stadium trucks, and, of course, she drives an RC10T. (The aforementioned is alleged, naturally!)

It's undeniable, however, that the beautiful Gloria was snagged by the camera posing happily—cozily, I might add—with the one she has ostensibly chosen to be her personal coach: Team Associated driver J.D. Beckwith. Ms. Estefan's choice has left Joel, Jay and Gil heartbroken; I heard they were entering self-imposed seclusion. Gene Hustling is proud, and Masami doesn't seem to care. As for me, well, I think I could be feeling jealousy for the first time. I'm not sure because, of course, that's a totally new experience for me! But wait; there are so many world-class racers on the circuit; why *did* she pick him? Hmmmmmm...

Lazer PHASES



The Lazer's design is so well-proven that Kyosho has introduced two new versions. The ZX-Sport has the basics of a Lazer design. It's a 4WD machine for racers who need to save some cash on the initial purchase; then, they can easily upgrade it as their budgets allow. The ZX-R is for racers who want *what* they want, *when* they want it; that's usually everything, immediately! Now there are Lazers for everyone; the cautious *and* the compulsive.



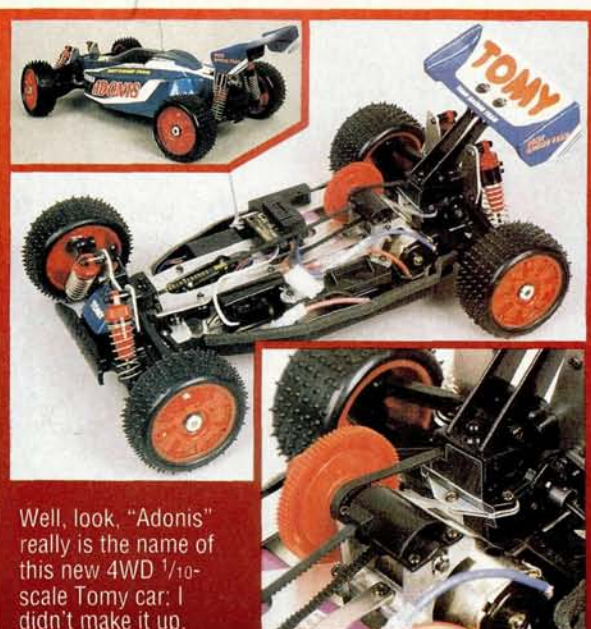
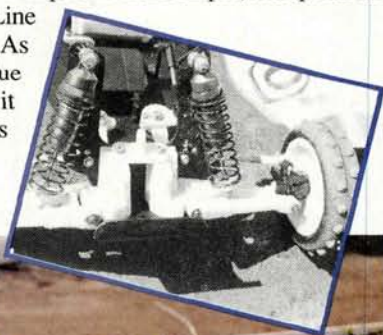
N DOG HAIRS

Did you ever finish that "perfect" paint job only to have your friends laugh at the dog hairs embedded in the hood of the brightly colored racer that you thought you loved? Well, help is on the way. Here's a sample of Parma's new, custom-series pre-painted bodies. Parma has hired a staff of experts to bring you painted bodies like these at prices that easily compete (\$35 retail) against the usual, basically boring, monochromatic, store-bought painted bodies to which we've become accustomed. According to Parma, these bodies have anywhere from four to six colors in their schemes! You could spend more than that buying a clear body and all the paint; then what happens if you screw up the job? Anyway, Parma guarantees—no dog hairs.



TRAXXAS TRX-1 WORLDS QUALIFIER!

You may remember my report on the new Traxxas 2WD car—the one that was called “Talon” for a day—in the October “Scoop.” Well, as it turns out, Traxxas couldn’t use the name, so it’s now called the “TRX-1.” But the bigger news is that this car, driven by Dallas’s Scott Montgomery, qualified 4th in the A-Main at the Worlds in Detroit. According to Traxxas, the car that ran was representative of an out-of-the-box production sample, except for its hard-anodized shocks and Pro-Line tires. Here are some close-ups. As you can see, it shares the Blue Eagle’s design philosophy, but it is a different car. Its release is planned for late October.



Well, look, “Adonis” really is the name of this new 4WD 1/10-scale Tomy car. I didn’t make it up. Anyway, this isn’t the first Tomy car I’ve had the goods on, and there’s *still* no distributor for them in the States as far as I can tell. The car looks “Lazerish” in design, with the twin belts driven by the central motor/counter gear setup. If anybody out there knows how to get one of these things, please contact me. I’ve been in touch with Tomy here in the U.S. and I got the run-around: I can only assume that the American market is too small for them.

ADONIS IN THE DIRT

As far as I know, Corally has never built a windmill or made wooden clogs. Corally is, however, known for such innovations as front anti-roll beams that require no adjusting and unique diffs with captive diff-ball-design spur gears. It now offers two new cars that look very threatening. The 1/12-scale SP12G is a new-generation design with coil-spring, anti-roll trailing front beams and the proven fully floating T-bar rear. The chassis is graphite, but Coral is still used for the suspension components. Also new is the 1/10-scale SP10 Super Speedway (SS) car that has been narrowed to fit the new, narrow NASCAR bodies. The chassis retains the caster/camber adjustments that have made Corally one of the racers’ favorites. In deference to us barbaric Yankees, the SP10SS comes with tires that have been glued and trued at the factory and NASCAR wheels that have been mounted on U.S. wheel adapters.



CORALLY RALLY

Get Started in

R/C



PART 1

YOU'RE READING THIS, so there's a chance that you're already into the hobby, but please read this four-part series of articles anyway. You'll be able to review some of the basics you might have forgotten or pick up advice for a friend who's interested in R/C racing, but hasn't started yet—perhaps help him to avoid wasting time and money, as many of us did when we started.

My son and I started out with a pair of Nikko Turbo Hoppers; they weren't cheap to run, and it was impossible to get parts for them. They were powered with AA-size batteries that gave about 10 minutes of run time and then had to be recharged overnight.

BUY CHEAP; BUY TWICE

After the first hassle over a broken trailing arm, we went to the local hobby shops to find something better, and we walked out with an MRC/Tamiya* Hornet, an MRC stick radio and an MRC battery pack and charger. The Hornet didn't handle well; as beginners, we found the stick radio hard to get used to; the charger didn't work very well; and we destroyed the battery by charging it repeatedly without letting it cool down! We also fought constantly over who would use the Hornet most (and next!) and who was responsible for maintenance!

The next hobby shop we

went to had salespeople who were willing to listen to our problems with the Hornet and tell us how to make everything work better. We walked out of there with a Tamiya Falcon, a Futaba* Magnum Jr. Radio, a Pro-Tech* charger and two Trinity* battery packs. I still use this radio and charger, and the Falcon and the equipment that came along with it were vast improvements.

The dealer at the second shop taught me a lesson: if you buy cheap, you buy twice. We now had two cars, two chargers and three battery packs, so we were both equipped, right? Wrong! The Hornet was no competition for the Falcon, and since I wound up with

the Hornet, something *had* to be done!

After going through about \$100-worth of hop-up parts, I gave up trying to make the Hornet work and bought an Associated* RC10. My son wasn't too happy (he couldn't beat me anymore on our home-brewed track), but we went on-road racing together. As we sharpened our skills, we picked up hop-up parts and accessories and, eventually, a *second* RC10.

After that first year, which we regarded as a time of learning, we became very competitive, but to reach that point, I spent close to \$1,000. With proper advice when I needed it, I would have spent half that and been competitive in half the time!

b y B O B G A G N E

GET STARTED

LEARN FROM THE BURNED!

Learn from my experience and be guided by this series. I'll discuss a variety of topics, and I'll try to point out what you should watch for and watch out for. Novices miss things that should be considered before a purchase is made. I've tried to be objective about what's really necessary and what's just really neat to have, and you should try to do the same

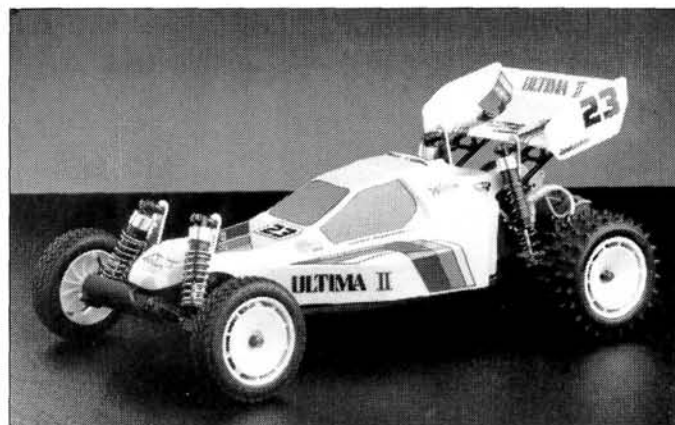


The Team Losi Junior Two is not only inexpensive, but it's also a fully developed race car.

trucks?

Most people start with off-road electric cars because they're versatile and relatively inexpensive. Assuming that an electric buggy is your choice, too, let's move on to selection considerations, of which price is one of the most important.

● **How much do you want to spend?** There are two schools of thought about this, and the first is the



Kyosho's Ultima II is a race car disguised as an entry-level car.

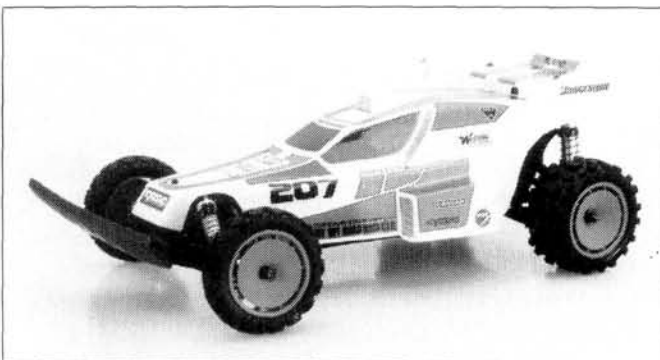


The Astute is Tamiya's most serious race car to date, but it has the standard Tamiya low price.

when you go to the hobby shop.

After reading this series and doing further research on the subject (I suggest *R/C Car Action* magazine and the *Car Action* special publications), ask your hobby shop for advice. They might have their own biases, but they're still the best source of information on the parts and accessories in the shop.

Stay away from mail order—for now, at least. You can't always get the help you need from a mail-order representative. Also consider that the local shop probably supplies the track on which you race and maintains an inventory of parts so you can get any part



The Kyosho Turbo Raider is equally at home on the track or in the backyard.

immediately. For the owner, this represents a large investment, and it should be rewarded with your patronage.

ASK YOURSELF...

● **What type of racing do you want to try?**—mostly

off-road (including backyards and empty parking lots), or on-road, at a local track that's paved or carpeted?

● **What type of power will you use?**—a gas engine, or an electric motor?

● **Do you prefer cars or**

“wait-and-see” school. Like me and my son, novice R/C racers in this group start with the least expensive car and equipment. The advantage of this is that you don't invest a lot, so if you find out you don't like R/C racing after all, you haven't lost much. The disadvantage is that the least expensive cars often give you the least satisfaction and the most broken parts and frustration. I'm sure that many potential champions have been turned off the hobby because they initially followed this path. In the long run, this approach is also expensive because cheap cars must be replaced frequently, so you'll eventually buy two or

more. The nice part is that you buy only the equipment that suits your skills and can buy replacements when you need to.

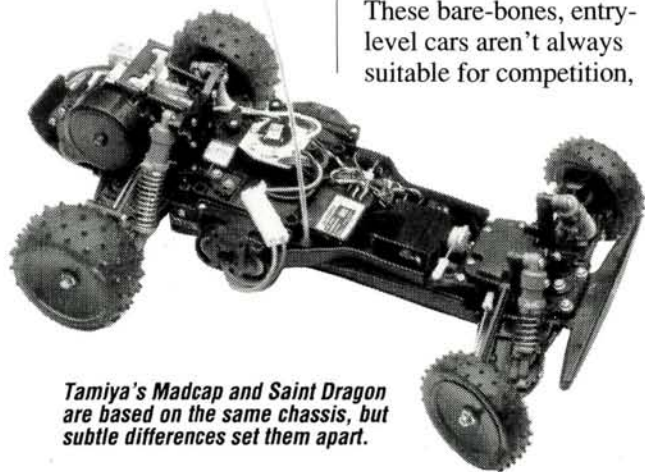
The second school of thought is the, "I-know-I'll-really-like-this" school. With this philosophy, you buy the best that you can afford. Its big advantage is

- How available and expensive are replacement parts?
- Can the car easily be upgraded to higher level of competition?
- How durable will it be?

Now that you know what to look for, let's look at the available cars.

"WAIT-AND-SEE" CARS

These bare-bones, entry-level cars aren't always suitable for competition,



Tamiya's Madcap and Saint Dragon are based on the same chassis, but subtle differences set them apart.

that you don't have to buy a replacement car soon; instead, you can build up a stock of parts and buy hop-up parts to enhance your car's performance. These cars are generally more durable and handle better out of the box. The disadvantage is that it may take you longer to save up for one. You won't have to buy basic equipment twice, so you'll save money in the long run, and you won't be frustrated by substandard performance.

THINK ABOUT IT!

Before you buy your first racer, consider these questions:

- How easy will it be to build?
- How competitive will it be, right out of the box?
- Will it require additional parts that will increase its initial cost?

but they're great fun for the backyard and the neighborhood. Generally, they're equipped with:

- mechanical stepped speed controller with reverse
- 540-type, closed-endbell motor
- plastic tub-type chassis

- polystyrene-plastic or polycarbonate body
- friction-type suspension dampers
- bronze, steel, or nylon bushings in the transmission and wheel hubs
- balloon-type tires with small wheels

Costing between \$50 and \$135, the cars in this category are:

Tamiya: Grasshopper II, Hornet, Falcon, Sonic Fighter, Madcap, Saint Dragon

Kyosho: Raider/Turbo Raider

Cox: Bandido, Scorpion

Traxxas: Cat

Futaba: FX-10

Panda: Cyclone

SECOND-LEVEL CARS

Entry-level cars on the second level have competition potential. As they come



The roots of the Team Associated RC10 Champ Edition can be traced back to the original RC10, which was released in 1984.

from the box, they're suitable for stock-class and novice competition; they can be upgraded as your skills develop; they aren't overly delicate or sophisticated; they're still fun in the backyard or neighborhood. They're typically equipped with:

- mechanical speed controller
- molded-composite, resin, or aluminum chassis
- aluminum coil-over, oil-filled shock absorbers
- bronze, steel, or nylon bushings with some ball bearings, usually at critical points in the transmission

—large wheels and low-profile tires

—polycarbonate body

Costing between \$120 and \$225, the cars in this class are:

Traxxas: Radicator

Losi: Junior Two

Kyosho: Ultima II and Turbo Ultima II

Team Associated: RC10 (basic kit)

Tamiya: Astute

These cars don't come with radios, but you can try to save money by working out a "package deal" with your hobby-shop dealer when you buy the car kit. A battery pack and a charger could also be included.

It's difficult for me to tell which specific car is best for you. You must consider all your needs and then choose. Be guided by your research, by a reputable hobby dealer, and by your preferences, using this article as a starting point.

Next month, I'll discuss the accessories you'll need for your new car, so stay tuned!

**Here are the addresses of the companies mentioned in this article:*
MRC/Tamiya, 200 Carter Dr., Edison, NJ 08817.
Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.
Pro-Tech; distributed by Model Craft Mfg., 3455 W 6th St., Los Angeles, CA 90020.
Trinity Products Inc., 1901 E. Linden, NJ 07036.
Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626. ■

READERS' RIDES

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If the Ayatollah chooses your photo, you'll receive a one-year subscription to Car Action, or an extension to your existing subscription. You'll also be eligible for the third annual "Reader's Ride of the Year Contest" in the fall of 1992. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.



■ SUPER HAULER!

John and Deanna Popp of Rock Island, IL, built this amazing machine. The Super Hauler started as a Tamiya Bullhead; additions include a Sassy Chassis SST chassis, triple shock mounts, JPS aluminum rims, Imex dual tires, three Trinity monster horsepower motors and a long list of parts that are too numerous to mention! For this piece of incredible machinery, John and Deanna get the *Car Action* subscription of honor.



■ TONY'S TIGER

Tony Growden of Pukekohe, Auckland, New Zealand, sent in this picture of his Pro Cat. Tony added several after-market parts to make the car faster and more reliable: MMS motor heat sinks; an MMS hexagonal rear Superdiff; a Novak T-1X ESC; a Twister 14 double; and a slipper clutch. He keeps this kitty under control with a JR Propo radio. It's Grrrrreat!



■ MIGHTY MODS

Greg Donarum of Bel Air, MD, transformed his prize-winning JR-X2. Why? Because he loves cars! He added an RPM front bulkhead, a Pocket Rocket 17-turn modified motor, Robinson racing bulkheads for the rear and a Velcro® watch band to hold the batteries. He then added a full set of JG monster truck rims, Pro-Line and DuraTrax tires and a '55 Chevy body with a McAllister hood scoop. Watch out, 'cause here comes Greg!



■ DON'T TELL THE "MRS.!"

Richard Crew Sr. of Garden Grove, CA, is responsible for this photo. Nuff said!

■ SIDEWAYS SNAKEBITE

Dave Hartranft of Schuylkill Haven, PA, races his RC10 Team Car in the rookie division of the modified dirt-oval class at the Cressona (PA) Mall Speedway. To the formidable Team Car package, Dave has added a Futaba radio and speed controller, a Trinity Joel Johnson stock motor and a set of Bolink's foam racing tires. Topping these off is a dirt-modified-body with a Don "the Snake" Prudhomme-style paint job. Killer machine, Dave!



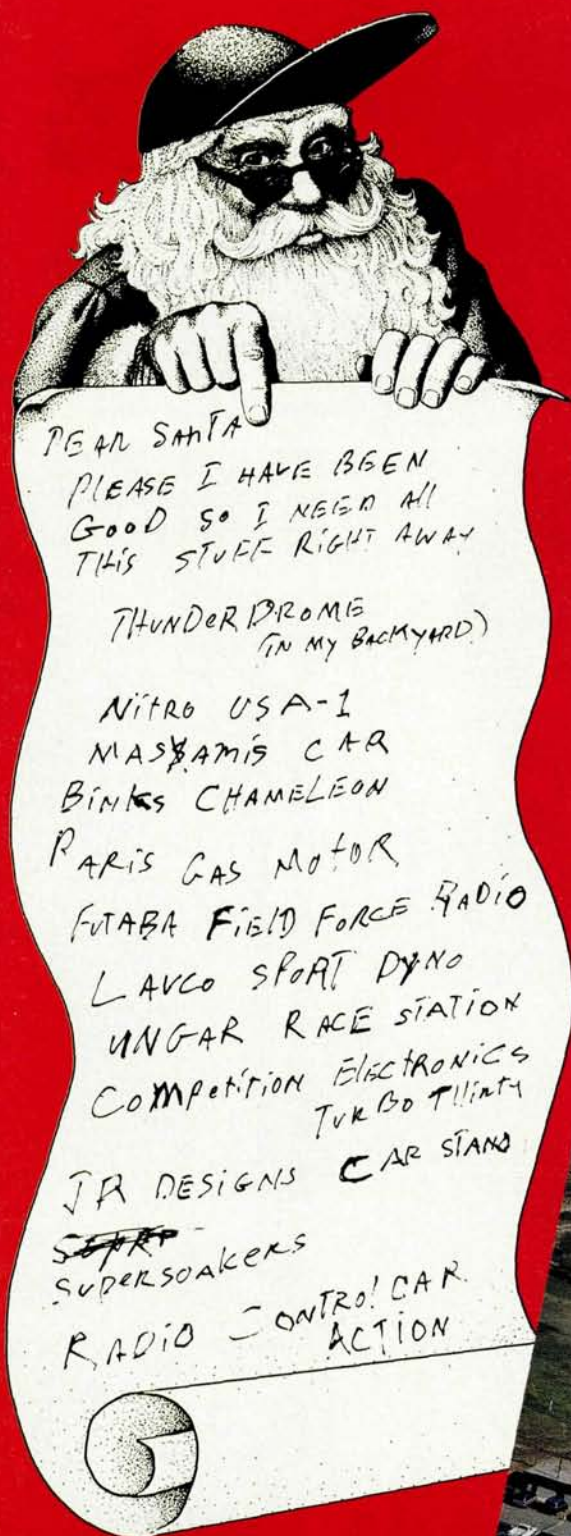
■ STRETCH JOB

Gregg Lapolla of West Hills, CA, decided to resurrect a Blackfoot that had been collecting dust. After he had cleaned it up, Gregg was struck with the brilliant idea of adding a second set of driving wheels to the rear. He did this by installing a homemade aluminum-frame extension and then extending the body to cover all the mechanics. Further mods include running boards, license plates, a rear body mount, a bed cover and front and rear bumpers, all of which were handmade. After that, he added a full set of HPI wheels, two B&R Magnum motors, a Novak T-4 and a set of Trinity oil-filled shocks. The final touch is Gregg's awesome paint job!



■ HEAVY METAL

Steve Betts of Fremont, CA, owns this heavy metal JR-XT, and it's different from any we've ever seen. Steve made his own chassis of laminations of carbon fiber, Kevlar and end-grain balsa; it's lighter than the stock chassis, and just as rigid. To ensure that no one else would have a car like his, Steve made a two-speed tranny like the one in the 1/8-scale on-road BMT car. With innovations like these, it's no wonder that Steve finishes in the top three at his local track!



DEAR SANTA

PLEASE I HAVE BEEN
GOOD SO I NEED ALL
THIS STUFF RIGHT AWAY

THUNDERDROME
(IN MY BACKYARD)

NITRO USA-1
MASHAMIS CAR
BINKS CHAMELEON

PARIS GAS MOTOR

FUTABA FIELD FORCE RADIO

LAVCO SPORT DYNO

UNGAR RACE STATION

COMPETITION ELECTRONICS
TURBO TILLY

JR DESIGNS CAR STAND

~~SEPP~~
SUPERSOAKERS

RADIO CONTROL CAR
ACTION

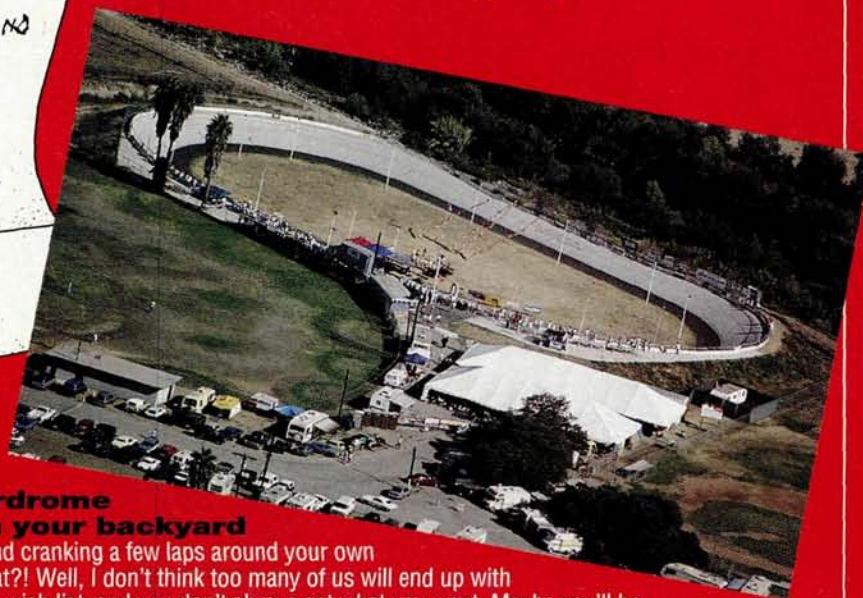


Christmas Wish List

Have a
cool yule!

by CAR ACTION
STAFF

WELL, HERE IT is again...that time of year when you have to cough up a Christmas "want" list to give to your relatives. Now, we know you were hoping for that personalized pencil set again, but here are a few more ideas for you to consider. They range from mild to wild, and include everything in between.



Thunderdrome in your backyard

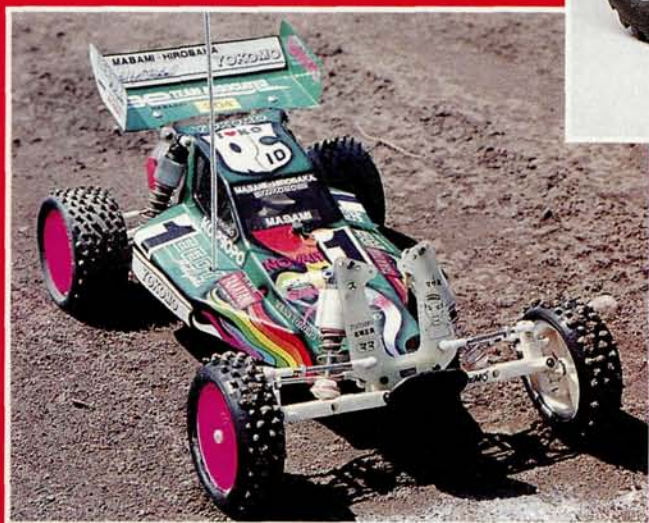
Imagine waking up on Christmas morning and cranking a few laps around your own private Thunderdrome! Wouldn't that be great?! Well, I don't think too many of us will end up with one of these for Christmas but, hey, this is a wish list, and you don't always get what you want. Maybe you'll be able to go to the 1992 Thunderdrome in Encino, CA. Now, that seems a little more down-to-earth!

Nitro USA-1 ▶

We can't have the full-size USA-1, but this one's pretty close. Based on the 1/8-scale Burns DX, this truck is built to stomp. It features a heavy-duty aluminum chassis, nylon double wishbones, a heavy-duty shaft drive system, three gear-type differentials, bronze bushings, huge 6.6-inch tires and eight oil-filled shocks. Add a 1990 Silverado body with chromed details, and you have the most devastating truck Kyosho ever designed.



PHOTO BY NAMI, S&B



Masami's Stealth Car ▲

Who *wouldn't* want this car? After its victory at the 1991 IFMAR Worlds, *everyone* wants one! It features a brand-new front end with long shocks and arms, a new double-deck graphite chassis, new rear arms and arm mounts and much more. (Masami's decals, body and driving skills aren't included.) We expect to see production kits available this year, although not in time for Christmas. If you're good in 1992, maybe Santa will bring you one next year!



Paris Rex Motors

Wouldn't you love to have a world-class engine in your gas car? Paris Racing engines are available for both on-road and off-road 1/8-scale cars. All Paris engines have been completely torn down and "blueprinted." The crankshafts have been heat treated, the backplates have been hard-anodized and, in the modified engines, the ports have been reworked. You can choose from either a Paris Spec Stock, or for that extra

edge, a Paris Modified Full Competition model. What the heck! you're asking Uncle Gus to get it for you; tell him you want *both*!



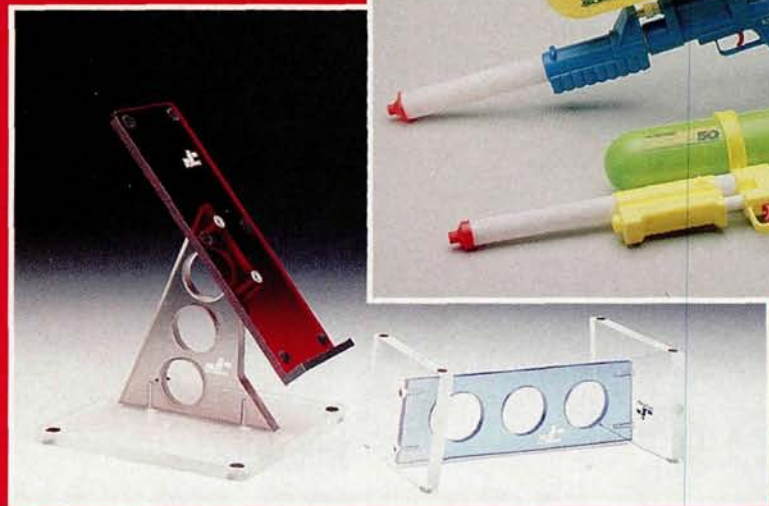
Binks Chameleon ▲

The Chameleon airbrush color changer is the most important advance in the art of airbrushing since the invention of the airbrush itself. It has never been this easy to switch colors! A dial allows you to select any of the nine colors held in the Chameleon's base; it also enables you to blend any two of them at a time. The dual-action Raven II brush (included) allows you total control over paint and air flow. The Chameleon can spray watercolors, oils, lacquers, acrylics, alcohol dyes and fabric dyes. Chameleon—the professionals' choice.

Futaba Field Force 3 ▼ PCM 1024

Most of us used stick radios when we started driving R/C cars (Masami still uses one). Although they lacked the many adjustments that new wheel radios have, they worked well. Now we have the best of *both* worlds: a stick radio that can not only be adjusted in myriad ways, but is also PCM to boot! The large LCD screen tells you all the pertinent info at a glance, and trim settings can be stored for up to six cars! Its other features include ATV, ATL, servo-reversing, six third-channel mixing options, one-touch trim buttons, fail safe and a timer. What else could you possibly want?





JR Designs Car Stands ▲

If you're looking for a really trick car stand, this is just the thing. Made of clear and colored plastic, these stands are a combination of style and function. The larger stand is designed for pan cars; it holds them vertically to give you easy access. The smaller stand is perfect for off-road cars. They have rubber feet that grip both the car and the surface on which the stand rests. The holes in the bases hold film containers in which you can store small parts. Check them out at your local hobby shop.

Competition Electronics Turbothirty ▼

The Turbothirty can help you keep your batteries in top form. Not only can it charge 1 to 7 cells at up to 12 amps, but it can also discharge packs at 25 amps and single cells at 30 amps.

With the optional printer port, it can record and print information, and it can be programmed to cycle up to nine times and peak-charge up to three times. Think that's it? You're wrong. Say you have to test a motor. Just set the voltage and the test time, and press "Start." The LCD screen displays voltage, amps, supply voltage and seconds. We have it on good authority that Santa uses the Turbothirty to keep those reindeer moving.



Ungar Race Station

It may be cold outside, but some like it hot. If we're talking about soldering irons, the hotter the better. Ungar's new Race Station UTC 300 is super-hot! The unit has a large pencil-type iron with an extra-large

tip that ensures quick heat transfer and a fast temperature recovery time. In the base, there's a control dial (with which you can select the temperature), and a sponge cleaning tray to help you keep the tip clean. (Different tips are available for other applications.) No racer should be without one!

Supersoaker 50 Supersoaker 100

We know it's hard to believe now, but summer will come again! When it does, this is the perfect weapon with which to battle a sweltering day while you wait for your next heat (no pun intended): the Super Soaker from Larami. Just pump these water guns to pressurize them, and they'll shoot a stream of water as far as 30 feet. The Super Soaker 50 has a 1-litre water tank, and the 100 has a 2-litre tank. Either unit will douse your opponent in seconds. (You may have a tough time finding one of these; they've been selling very well!)



Lavco Sport Dyno ▲

If you want to squeeze all the performance you can out of your motors, a dynamometer is a necessity. The Sport Dyno has all of the Lavco Pro Dyno's features, but it's in a smaller case and its range of functions are slightly smaller. Like the Pro Dyno, it reads motor rpm and power, but only in 10A, 15A and 20A rates; unlike the Pro Dyno, it won't drain your Aunt Gert's savings account. The unit has Mosfet circuitry for precise voltage regulation, an infrared rpm pickup for accurate readings, a custom-wound load motor and a large heat-sink motor mount with a custom-flex coupling. Get real info about your motor with the Lavco Sport Dyno!



Radio Control Car Action

Don't be left in the weeds! In today's fast-moving R/C world, you need all the tech info you can get. There's no better place to get it all than the pages of *R/C Car Action*. Each month, you'll get tons of informative "how-to" articles as well as reviews of the latest hot cars; and look out for those *special issues*!! Have a cool yule...all year long!

FINDING THE RIGHT gear ratio for optimum performance and efficiency is probably one of the most misunderstood processes a

new R/C enthusiast encounters. By simply changing any combination of spur or pinion gears, racers can make their cars accelerate faster, achieve a higher top speed, or yield longer run times. Most of the high-quality cars and trucks

on the market today (e.g., Losi's Junior Two, and Associated's RC10) have external spur and pinion gears that allow for quick and easy gear changes. So many variables are involved in determining the best combination of pinion and spur gears that it can easily overwhelm even the most experienced racer.

The surfaces on which R/C enthusiasts run their cars can range from short tracks with many tight corners to wide-open parking lots where all-out speed is the norm. Unfortunately, there's no generic way to set up a car so that it performs at its best on all driving surfaces. When it comes to gear ratios, all you can do is set up the car according to track conditions.

The following information should help to unlock the mysteries of gear ratios and provide a better understanding of how

gear ratios play an important part in dialing-in your car or truck for maximum enjoyment and maximum output.

SPUR OF THE MOMENT

Without a doubt, the most accurate way to determine the right combination of performance and efficiency for any track condition or motor choice is with the following mathematical formula:

$$\text{Spur Gear} \div \text{Pinion Gear} \times \text{Transmission Output} = \text{Final Drive Ratio}$$

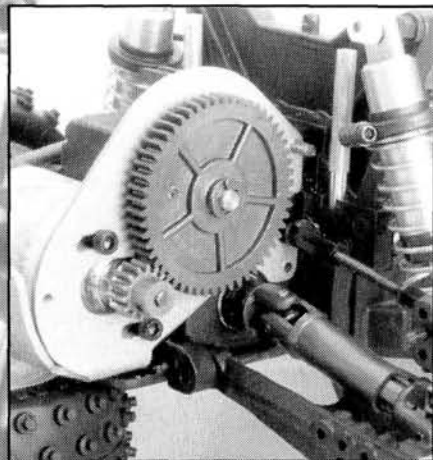
For example: Team Losi's JRX-Pro has a transmission output ratio of 2.18:1. Let's say you're using an 82-tooth spur gear coupled to an 18-tooth pinion gear; just plug all of this information into the equation to determine the final drive ratio of this particular setup: $82 \div 18 \times 2.18 = 9.93$.

The final drive for this car is 9.93. A larger spur gear or a smaller pinion gear produces a higher final drive ratio. Likewise, a smaller spur or larger pinion produces a lower ratio. (I'll have more on what these numbers mean to the overall performance of your car later).

Basically, a gear ratio is how many revolutions the motor must make in order to turn the tires one full revolution. A final gear ratio of 9.93:1 means that the motor has to turn 9.93 times to turn the tires one full revolu-

Gear It Up!

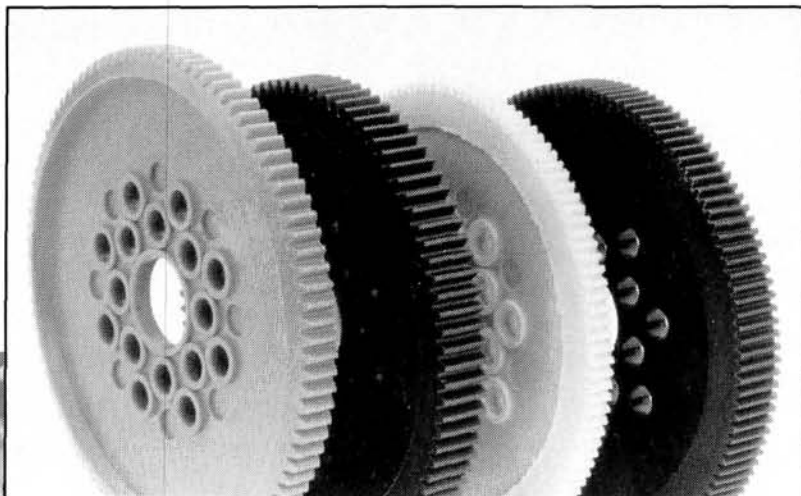
by GEORGE GONZALEZ



The 32-pitch gears shown are ideal for beginners because they're rugged and have large teeth. As with all gears, proper mesh is essential to ensure optimum performance.

PHOTOS BY YAMIL SUEO

Quit Meshin' Around!



Of the three gear pitches available for R/C cars, the author recommends 48-pitch gears (left) for off-road use, because they're durable and smooth. Because they're precise and offer a larger choice of ratios, he thinks 64-pitch gears (right) should only be used for on-road racing.

Gear It Up!

tion. If you substitute a 20-tooth pinion gear for the 18-tooth pinion gear, the ratio would be 8.94:1, and the motor would have to turn fewer times to turn the tires one full revolution.

This is where many new enthusiasts get confused. They think, "The higher the number, the higher the gear ratio." This is incorrect. Actually, the higher the number, the lower the gear ratio. Here's a way to simplify things: the lower the gear ratio, the more quickly the car will be off the line; however, the car will lose some top-end speed. The higher the gear ratio, the more quickly the car will be on the top end; however, the car will lose some off-the-line get-up-and-go. Use a higher gear ratio for a stock motor and use a lower gear ratio for a modified motor. Perhaps this is an oversimplification, but it's a rule of thumb.

LIFE'S A PITCH!

There are three types of gear pitch—32 pitch, 48 pitch and 64 pitch. The "pitch" refers to how many teeth-per-inch the gear has, and each size has its advantages and disadvantages. The 32 pitch is very durable and meshes very well, but it has a limited range of gear ratios and doesn't run as smoothly as some others do. The 64-pitch gear has the widest range of gear ratios and runs very smoothly, but in my opinion, 64-pitch gears should only be used for direct-drive cars,

because they're very delicate and can be stripped easily. The 48-pitch gear is the happy medium because it meshes well; it offers a wide range of gear ratios; it operates smoother than 32-pitch gears; and it's more durable than 64-pitch gears. For these reasons, I recommend 48-pitch gears for off-road racing.

HOW TO CHOOSE THE RIGHT GEAR RATIO

Choosing the right gear ratio involves several factors: the final transmission ratio, the wheel and tire diameter, the type of motor, battery and racetrack. Before you buy a modified motor, get used to your car's capabilities. Some car kits are equipped with stock mo-

tor to gear the car for the best possible compromise between all-out top speed and out-of-the-corner "punch," and to end up with a run time of 4 minutes plus exactly one lap. Do this to make sure that, if your car crosses the line at the buzzer, you'll be able to squeeze in that extra lap. Sometimes this requires running the motor a little hotter than you'd like. This isn't the best thing for it, but with proper motor maintenance you can still get a long life out of it. Keep in mind that there are long tracks with long straightaways and there are short tracks with hairpins and berms on every turn. You must gear the car for the track you're on (sometimes it's as easy as adding or subtracting one or two teeth on the pinion gear). If you like to run your car in parking lots and driveways, gear your car lower to make it run cooler. Run times are longer, but the top speed is slightly diminished.

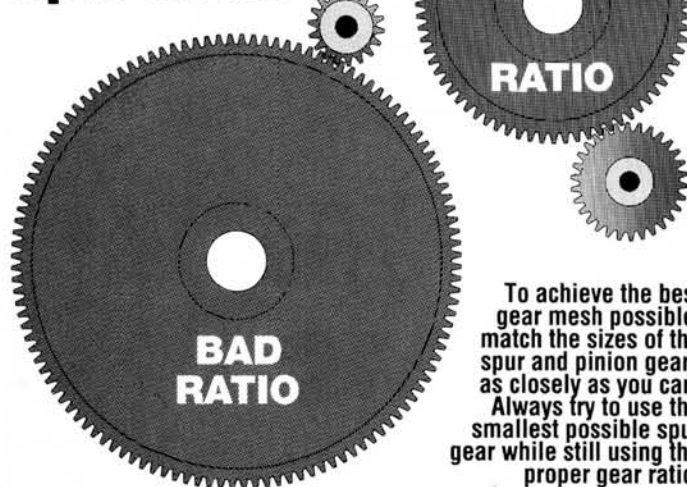
WHICH DO I CHANGE—THE PINION OR THE SPUR?

You achieve almost the same gear ratio by changing either the spur or the pinion gear, e.g., an 81-tooth spur gear and a 15-tooth pinion gear produces a spur/pinion ration

of 5.40; and an 87-tooth spur gear and a 16-tooth pinion gear produces a spur/pinion ratio of 5.43. The numbers are very close, and so are the results, although many racers say that they can feel a difference.

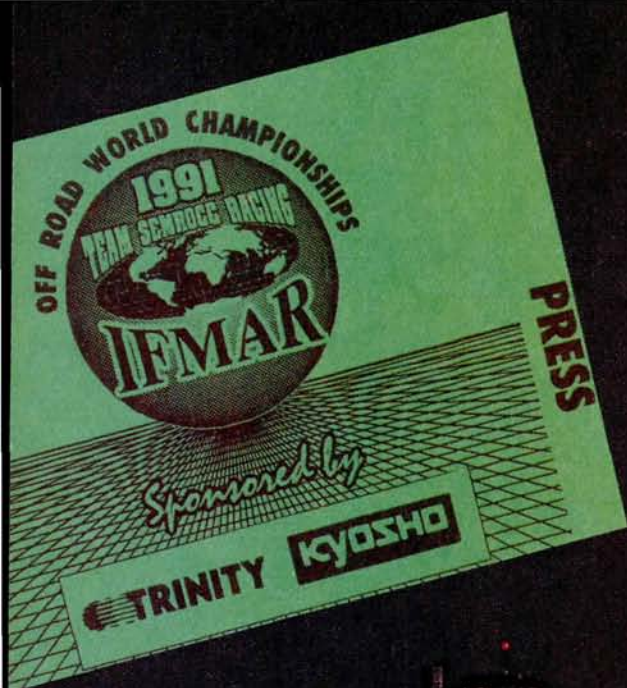
(Continued on page 78)

Matching Pinion and Spur Sizes



tors and pinion gears (in addition to the spur gears that most kits contain); if yours isn't, I strongly suggest that you invest in a good stock motor and a variety of pinion gears.

Go to your track and experiment with different gear ratios. The goal



by STEVE POND

WHILE PACKING for the Kyosho/Trinity '91 IFMAR 1/10-Scale Off-Road World Championships, I was faced with the awkward task of explaining the purpose of my two-week trip to Sterling Heights, MI, to some relatives. To laypeople, "radio control" is something that's used to change TV channels or, at best, it's one of those "little toy cars" that they've seen at an electronics store or in the home-shoppers' catalogue. I tried to explain that the R/C models that would be raced at this event were sophisticated; that they'd be driven by some of the best drivers in the world; and that every two years, such drivers meet to battle for the title of "World Champion." Despite my best efforts, though, my relatives didn't completely grasp the concept of R/C racing!



1991 IFMAR

OFF-ROAD WO

KYOSH O / T R I N I T Y

Detroit

W A R F A R E !

WORLD CHAMPS



PHOTOS BY STEVE POND

Below: To let off some steam, Lett shot a few hoops between races.



Above: The A-Final action was as close as it could get. Masami, Vehlow and Reed led the pack into the 2nd turn.



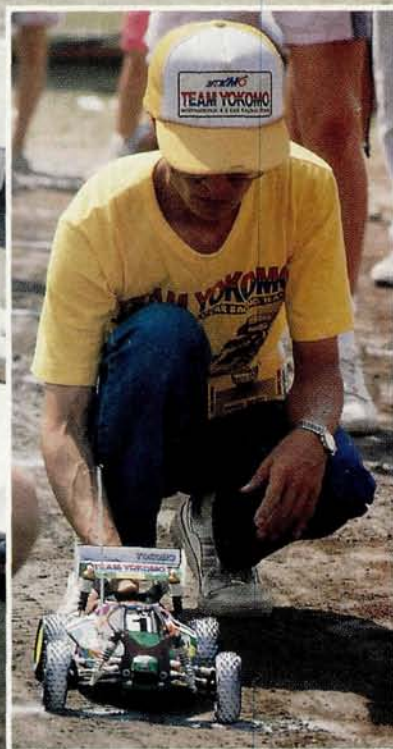
Above: Busted! "Tony Tony" caught Masami Hirosaka and Brian Kinwald sneaking into the Trinity/Losi trailer.

Right: Masami's teammates give him the "victory drenching." Below: Look closely at the decal on the front shock tower of Masami's Stealth car.





Here are the '91 2WD IFMAR Worlds top finishers: Hirosaka, Vehlow and Reed.



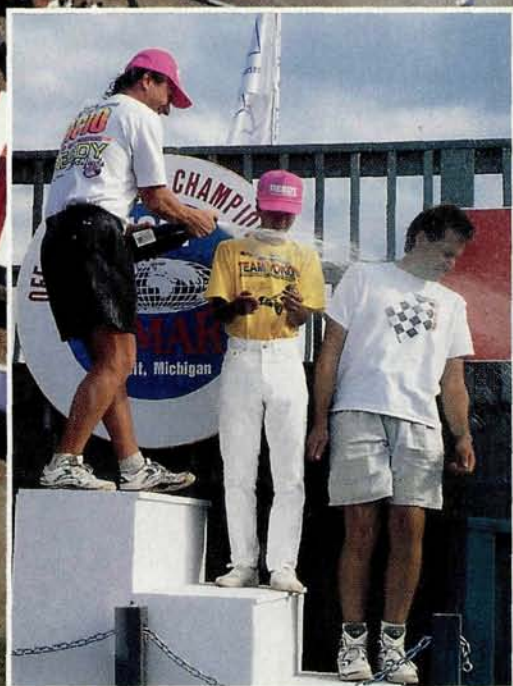
Left: Masami's father set the 4WD car up on the starting grid. The white stuff on the tires is a Yokomo product that prevents dirt build-up.

Below: To make the new Stealth car perform, Lett and Associated did extensive R&D; no copies here!

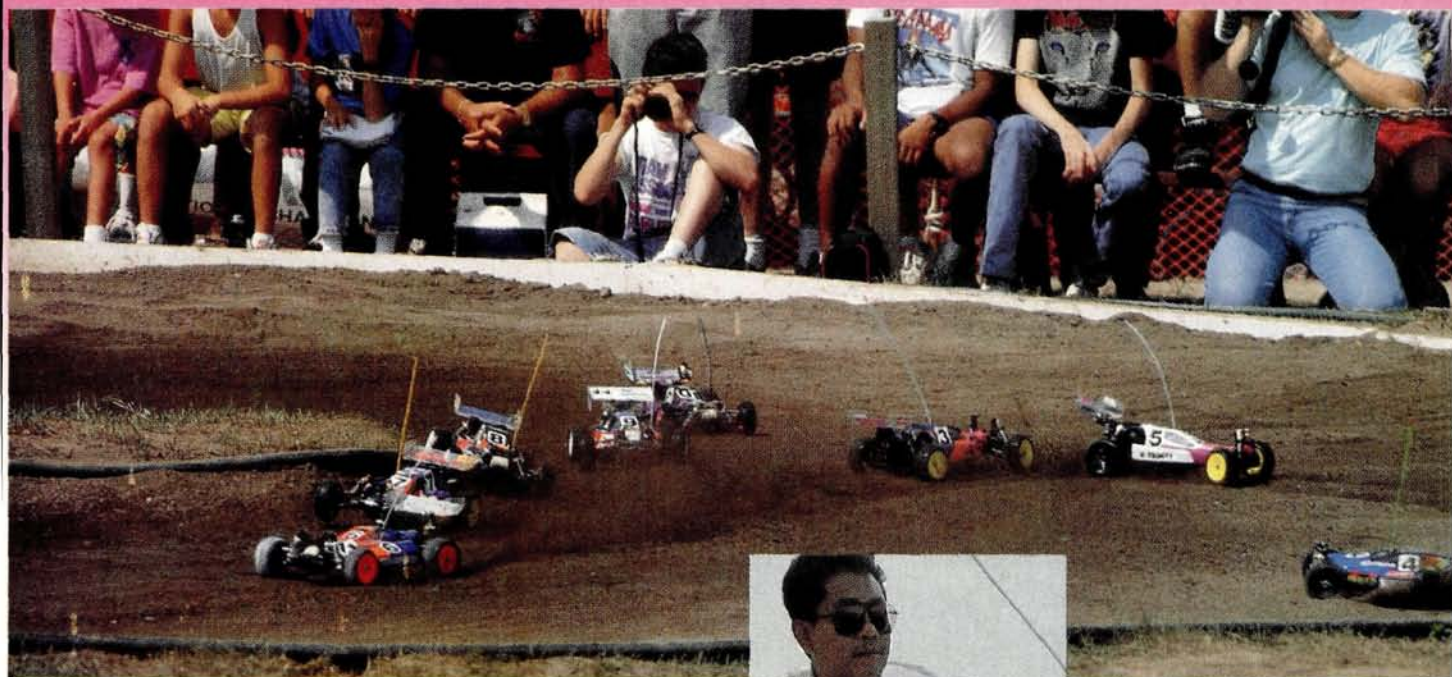


Above: Masami's car made a horrific traction-roll during the Finals, and this enabled Reed, Vehlow and Montgomery to slide by.

Left: Cliff Lett shows Masami and Jack Johnson after his first World's victory.



Detroit



Sixth-place qualifier and eventual 4WD Class winner Cliff Lett leads the rest of the pack through the first turn during one of the A-Finals.

WHAT ARE THE WORLDS?

IFMAR, the sanctioning organization that's responsible for the World Championships, isn't a club that "lucked into" a big race, nor does it have a membership. It consists of the large governing bodies: ROAR (which represents the U.S. and parts of Canada and Mexico), Europe's EFRA and the Far East's FEMCA. They join forces just to stage world-championship events in all the popular racing classes. To qualify for the Worlds, drivers must place in the finals of the previous Worlds or in the finals of events selected by the governing bodies.

Every two years, 120 drivers travel to a different part of the world to compete in the Off-Road World Champs. The first was held in Del Mar, CA ('85), the second in Romsey, England ('87), and the third in

Sydney, Australia ('89). This year's event—the fourth—came full circle, back to the U.S.

The drivers begin the competition with six rounds of qualifying heats. Each heat consists of 10 cars, and it's run using a staggered-timing system. The cars leave the starting grid—one after another—in 1-second intervals, and as each one crosses the starting line, it starts its own clock. None of the cars has the advantage of a front-row start; each runs against its own clock, so it doesn't matter where or when it starts. The drivers have 5 minutes to cover as much ground as possible before the clocks stop. At the end of the final qualifying round, the drivers are grouped into Finals (Mains) of 10



cars each, based on their fastest runs.

The A-Final consists of three legs (rounds), and in each one the drivers earn points depending on their finishing positions (i.e., 10 points for 1st place, 9 for 2nd, etc.). At the end of the three legs, the drivers combine their two best

scores, and this determines the World Champion. The lower Finals, from B down, only run one leg each to determine the winner.

WORLDS' WARM-UP

The World Championships actually started well before the opening ceremonies on August 4. The drivers had the chance to familiarize themselves with the track during the "warm-up" race, which was held about a month earlier. Much of the hardware that was used at the warm-up race wasn't anything like what was used at the Worlds. Most manufacturers and team managers kept their secret weapons hidden; they didn't want to tip their hands! At the end of the warm-up race, though, a

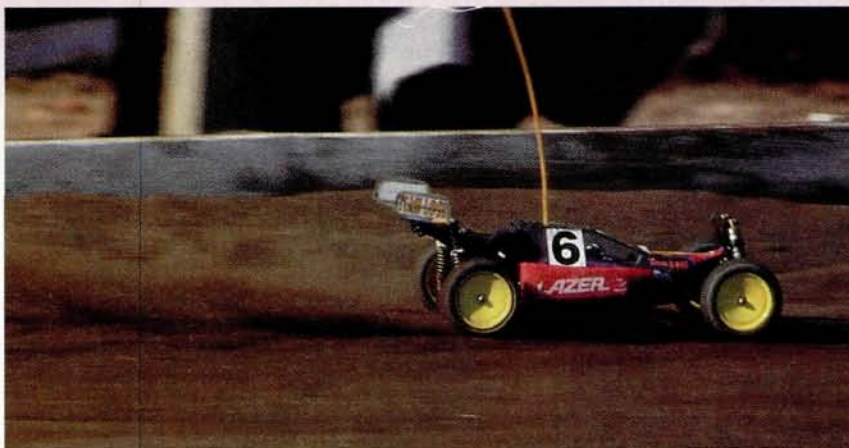


Detroit WORLDS OFF-RO



Hirosaka's 2WD Associated Stealth prototype car achieving some "air time" on its way to his fifth world championship title.

Right: Kyosho demonstrated its new Lazer ZX-R. Notice the longer front shocks.



few team drivers tested their "real" competition race cars.

WORLD-CLASS TRACK

The host club for the '91 World Championships was SEMROCC. Its facility is in Freedom Hill Park in Sterling Heights, MI. Unlike the rock-hard track surfaces that made tire selection important in Romsey and Sydney, SEMROCC's track had a soft, fluffy dirt surface that provided excellent traction. It was bumpy, however, and this made suspension setup critical. Team Kyosho's Mike Burnette summed it up, "I'd like to see 1 square foot of this track that doesn't have a bump; I'd frame it." The bumps could make or break the drivers.

The "Surf's Up" section, which ran along the short front straightaway, was the most challenging part of the track for many drivers. If they didn't choose the proper line or find the right rhythm, their cars were "swallowed up" by a long string of short, choppy jumps. In the words of Team

Trinity/Losi driver, Joel Johnson, "When the announcer calls 'Finish the lap you're on,' and I clear the 'Surf's Up' section for the last time...it's such a relief."

For most teams, the problem wasn't getting enough traction; it was having *too much* traction. Using a tread that was too aggressive caused the cars to traction-roll in the turns, so many drivers used tires with medium-spike designs. These allowed the cars to slide laterally, which kept them top-side-up.

HEAVY-HITTING HARDWARE

There were more prototype cars raced at the World Championships than at any other event, and nearly every car driven by the larger teams was extensively modified. Headlining the show was Associated's Stealth car—an updated version of the coveted machine that won the '89

Most manufacturers and team managers kept their secret weapons hidden; they didn't want to tip their hands!

Worlds in Sydney; and I was finally allowed to photograph it!

During practice runs, the Stealth car had trouble with the bumps. It was too fast for certain sections, and it couldn't clear the rough areas without tumbling. Just in case the drivers couldn't tame the track with this new car, Associated had one of the original Stealth cars shipped to Detroit. As it turned out, though, the new Stealth came through with flying colors, and the old car was never taken out of the box.

The 4WD Yokomo cars driven by the Associated/Yokomo team members resembled the Works '91 cars, but they had prototype suspension

components and a few other minor modifications that made them more suitable for bumpy tracks.

The most serious threat to Associated came from Team Trinity/Losi's new 2WD car. It seemed to handle the track better than any other car in the



Here's Ms. Moo, Nina Harkey, with Lett's Stealth car.

AD CHAMPIONS



field. It had a special slipper design and numerous suspension-geometry modifications that made its performance the smoothest and most consistent through the Surf's-Up section.

Kyosho Team drivers ran the new Triumph and Lazer ZX-R cars in the 2WD and 4WD classes, respectively.



They were probably the closest things to production cars run by any major team. Although both had a few trick parts that were designed for the SEMROCC track, most of their components were stock.

Schumacher campaigned

with its top of the line cars—the Pro Cat 4WD and the Cougar 2WD. They were also very similar to what's available in hobby shops, although their suspension geometries had been modified and featured special components.

Traxxas made a name for itself in the 2WD class with the TRX-1. Two of the Trax-xas team drivers used this car, but Traxxas also gave one to anyone who wanted to drive it at the event. Although it doesn't have an upper plate, the TRX-1 resembles the '89 Stealth car. It had extra-long suspension arms to limit tire scrub. It showed promise by qualifying for the A-Final in the hands of Scott Montgomery.

Tamiya, a company that offers some of the best entry-level kits in the industry, also made a showing at the Worlds with highly modified versions of its 2WD and 4WD race cars—the Astute and the Egress.

The infamous towels that



In the pits, Rick Hohwart of Peak Performance Motors carefully checked the competitors' batteries to see if they met IFMAR requirements.

are used to cover special cars were noticeably absent from the event. Though some manufacturers were reluctant to have their cars photographed too closely, most were cooperative with members of the press who wanted to take pictures.

4WD QUALIFYING

Racing action at the Worlds began with the 4WD - Class qualifying, and all eyes were on

"I'd like to see 1 square foot of this track that doesn't have a bump; I'd frame it."

reigning champ Masami Hirotsuka. Although he set the time to beat—a blistering 12 laps in 5:05.04—Jack Johnson applied some pressure with his Lazer and turned in a time that was slightly less than two seconds behind that of Hirotsuka. The talented Cliff Lett also set a fast pace with his Yokomo but, as a penalty for not being on the track to marshal at the start of the race that followed his, he lost his best qualifying time. This put him in 6th place behind Kris Moore, Satoshi Maezumi and Joel Johnson.

Deteriorating track conditions prevented drivers from beating the fast times that were achieved in the early qualifying rounds. The 4WD cars were



Hey, what's this? Chris Doseck at an off-road race? Although Chris didn't enter the Worlds, he plans to run the new Associated truck at upcoming off-road races.

Detroit WORLDS OFF-ROAD

Controversy is inevitable whenever talented drivers gather to compete. At the '91 Worlds, there was talk about the use of "illegal" cells. It was implied that some of the large teams were using the new Sanyo and Panasonic 1700mAh SCR cells that aren't yet available to the public.

Are these cells really illegal? In the IFMAR rules, the parameters for determining a cell's legality are sketchy. First, it's stated that all batteries must be sub-C's with a manufacturer rating of 1.2 volts, and they must be 23mm in diameter and 42mm long. Later, it's stated that production tolerances are allowed, but there are no guidelines given for this. It's also stated that cells must be commercially available and bear the manufacturer's identification, but what determines availability? Again, the rules don't include specific guidelines. This means that, theoretically, you could run with a pack that's covered in approved shrink-wrap and consists of cells that are larger than the common 4000mAh D-cells and are sold only at a grass

hut in the Fiji Islands.

The argument is that if the technology isn't available to everyone, then it shouldn't be allowed. What people seem to forget is that the large teams compete with *many* things—cars, tires, motors, brushes and other acces-

sories—that aren't available to the public. This also happens in full-size car racing. In Indy car racing, for instance, Roger Penske and the Penske Racing Team had an exclusive, two-year contract with Ilmore Engineering for the Chevy Indy V8 engine. Even after the two years had passed and other teams could get the

engines, Penske is still the only one allowed to work on the engine.

It's sad to think that people win simply because they have the best equipment, but it's true. All the driving talent in the world can be undermined by substandard equipment. Sponsored drivers usually have an edge because they have manufacturers (and a bank-

CELLS FROM HELL



Tech inspectors in the impound tent measured the cells to determine their legality.

roll) behind them. It's also true that some companies have a lot of "pull," and they may manage to procure cutting-edge technology that others can't, i.e., the "illegal" cells.

Making technological advancements is an integral part of R/C car racing. Some people get their hands on new technology more quickly than others, but in the current rules (or lack thereof) this isn't illegal. At *Car Action*, we'd like to see clear, fair racing guidelines developed, and they shouldn't be limited to battery technology. As things stand right now, though, you can't really complain about someone using a better mousetrap.

very rough on the track, and there was little time for the hard-working track crew to completely repair all the ruts and bumps that developed. In fact, most of the 4WD-Class drivers posted their best times

in the first or second qualifying rounds.

After the 6th round of qualifying, seven of the 10 4WD A-Final competitors were American, two were Japanese and one was English.

4WD A-FINALS

In the first leg of the 4WD A-Final, Lett battled it out with teammate Hirosaka, who got a good jump at the start for an early lead. Lett paired up with him, and the two left the field in their dust. They duked it out for 5 minutes, and though Hirosaka held Lett off for most of the race, Lett patiently waited for him to make a mistake.

In the last minute, that's just what happened, and Lett motored by him. In wheel-to-wheel racing action, Hirosaka made a strong charge to regain the lead, but Lett fended him off and held on for the win.



As I left the airport, I thought I saw Yokomo's new secret weapon. It turned out to be a huge 3D billboard for Uniroyal tires.



AD CHAMPIONS

IFMAR World Championships

FINAL POINTS—4WD

	NAME	LEG 1	LEG 2	LEG 3	DROP	TOTAL
1	Cliff Lett	10	9	9	9	19
2	Masami Hirosaka	9	6	10	6	19
3	Jack Johnson	8	10	5	5	18
4	Joel Johnson	7	4	8	4	15
5	Satoshi Maezumi	2	7	7	2	14
6	Scott Anfinson	4	8	1	1	12
7	Kris Moore	6	2	4	2	10
8	Kevin Moore	1	3	6	1	9
9	Mark Francis	3	5	2	2	8
10	Mike Dunn	5	1	3	1	8

FINAL POINTS—2WD

	NAME	LEG 1	LEG 2	LEG 3	DROP	TOTAL
1	Masami Hirosaka	6	9	10	6	19
2	Rick Vehlow	4	10	9	4	19
3	Kyle Reed	10	8	8	8	18
4	Kevin Moore	8	7	7	7	15
5	Mark Pavidis	9	3	3	3	12
6	Jurgen Lautenbach	3	6	6	3	12
7	Satoshi Maezumi	7	5	1	1	12
8	Scott Montgomery	2	4	5	2	9
9	Craig Drescher	5	2	4	2	9
10	Derek Furutani	1	1	2	1	3

There was more heart-pounding racing in the second leg, but Hirosaka wasn't in the running. (He made a few too many mistakes and fell back behind the middle of the pack.) Lett was again at the front the pack, but this time, he was chasing Team Trinity/Losi driver Jack Johnson, who was driving a Kyosho Lazer. During lap 7, Lett's car rolled, and this gave Johnson some breathing room. To narrow the

gap, Lett made a hard charge, but Johnson laid down the power and won with the fastest run of the event—12 laps in 5:04.99. Lett closed the gap to less than half a second for 2nd place, and Scott Anfinson, who was just less than 5 seconds behind Lett, took 3rd.

In the final leg of the 4WD A-Final, Hirosaka was back in the running with a smoking first lap that was more than 2 seconds faster than that of

2nd-place runner Mike Dunn. Lett followed closely in 3rd. This was a good enough finishing position for him to win

the class title even if Hirosaka won the leg. Lett also had to watch the hard-charging Jack Johnson, though. He and

FANCY FOOTWORK



At the '87 World Championships in Romsey, England, the then unknown Masami Hirosaka surprised everyone present by winning the 4WD Class as an unsponsored driver. After the racing was over, Masami demonstrated his driving ability by using his feet to control his car as it went around the track. Needless to say, this was a real favorite with the crowd.

At the most recent Worlds, Masami once again put on a show for everyone by driving with his feet, but this time, he was challenged to try the trick with a wheel radio instead of his trademark stick-transmitter. Well, non-believers, the young Japanese silenced all those in doubt, proving once again why he is the only driver in the history of the sport to ever win five World Championships.



Detroit

W O R L D S O F F - R

ALASKA MAN



At most large R/C events, you usually hear an interesting story about a competitor who overcomes seemingly impossible obstacles. Jerry Cameron Jr. was the only racer from Alaska

(ROAR Region 11), and his determination to compete in the '91 Worlds—including a willingness to make the 4,500-mile drive to Detroit—makes just such a story. With his mother in tow, Jerry

set out on the six-day journey to Detroit in the family Lincoln. He planned to race his Schumacher Cat and Associated RC10. Each car was equipped with only one set of tires, and he brought very few spare parts. His motors were so worn that their brushes were almost useless, and his batteries were so old, it looked as if they had lost their shrink-wrap a year earlier.

Despite a long road trip, old equipment and poor odds, Jerry was determined to compete. If put in similar situations, most racers wouldn't even *consider* attending the Worlds. After hearing Jerry's story, representatives from Team Tanaplan (a company that manufactures R/C performance accessories), pulled out



all their display equipment to help him with his racing efforts. They even let him run a prototype 4WD car that had fragile hand-made parts! Others donated batteries and accessories; Jerry was off to the races!

Although he didn't take his long-shot chances and parlay them into a win at the Worlds (he finished next to the last in 4WD and 88th overall in 2WD), Jerry's attitude about the event was admirable. Against all odds, he set out to do his best and have a blast, no matter what happened. That's what R/C racing is all about!

Hirosaka were—barring a major catastrophe—the only threats to Lett's chance for the title. Johnson, however, made a bum start, and this knocked him back to 9th position. Dunn made some bobbles and fell back in the field, leaving Hirosaka and Lett well out in front. Lett had only to hold onto his position for the overall win, which he did. Hirosaka crossed the line with

12 laps in 5:05.61. Lett finished about a second later, with Joel Johnson almost 10 seconds back in 3rd.

After each racer had dropped the results from one of the three legs, it was determined that Lett and Hirosaka were tied. The officials used the results of the leg that had been dropped to determine the winner. Hirosaka's 5th-place finish in the 2nd leg was far short of Lett's worst finish of 2nd place. Lett was the '91 4WD-Class World Champion!

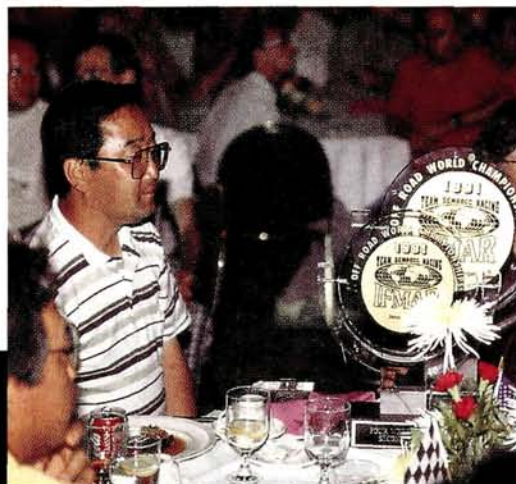
The sched-

ule included a day off after these races so that everyone could wind down from the 4WD Class and tune-up for the 2WD Class.

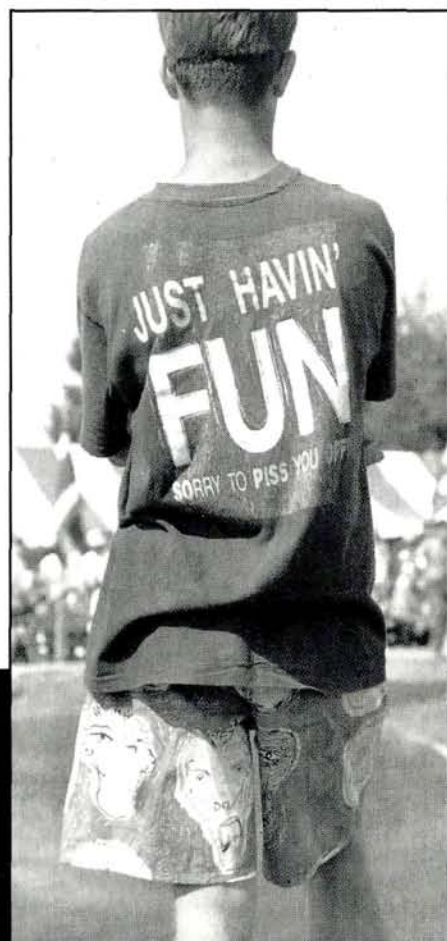
2WD QUALIFYING

Some of the successful 4WD-Class drivers were also 2WD-Class contenders. Hirosaka, who was also the defending 2WD champ, set the pace early with 12 laps in 5:18.56. Lett was also strong in a subsequent run, but his 12-lap time was about a second be-

hind that of Hirosaka. This put him in 2nd-place on the grid through the fourth round but,



Left: Yokomo owner Tom Yokobori with the 1st- and 2nd-place 4WD trophies.



AD CHAMPIONS

4WD 17MAR Worlds Champions

Fin.	Name	Country	Chassis	Motor	ESC	Radio	Batteries	Charger
1	Cliff Lett	USA	Yokomo prototype	Reedy Mr. M	Novak M1c	Airtronics C52P	Reedy SCE	Yokomo YZ
2	Masami Hirosaka	Japan	Yokomo prototype	Reedy	Novak M1c	KO Esprit II	Yokomo Matched	Yokomo YZ
3	Jack Johnson	USA	Kyosho Lazer	Trinity Tri-Rotor	Novak MXc	Futaba PCM	Trinity SCE	Victor Super
4	Joel Johnson	USA	Kyosho Lazer	Trinity Tri-Rotor	Novak MXc	Airtronics 3P	Trinity Pushed	Comp. Elec.
5	Satoshi Maezumi	Japan	Yokomo prototype	Atlas Orange	Tekin 420F	KO EX-I	Atlas	KO BX-202
6	Scott Anfinson	USA	Yokomo Works '91	Reedy Mr. H	Tekin 411P	Airtronics C52P	Reedy SCE	Tekin 100L
7	Kris Moore	USA	Kyosho Lazer	Twister	Novak MXc	Kraft	Max-Cell SCE	Novak
8	Kevin Moore	UK	Schumacher Pro Cat	LRP	Pinic E	KO EX-1	LRP	LRP SCE
9	Mark Francis	USA	Yokomo YZ-10	Reedy Mr. H	Novak MXc	Airtronics XL2P	Reedy 1700	Comp. Elec.
10	Mike Dunn	USA	Kyosho Lazer	Race Prep	Novak MXc	KO EX-I	Race Prep	Novak



during his best run, he incurred another penalty (5 seconds) for course cutting. (He put all four wheels in the grass.)

The 2WD cars weren't as hard on the track, so it was

easier for the crew to groom it. Although a well-maintained track would enable the drivers to do their best in all the qualifying rounds, many were still tainted by what had happened in the 4WD qualifiers. They

worried about being able to improve on their early times in the later rounds. The race for the A-Final was far from over.

In the third round, Team Schumacher's Kevin Moore ripped off a 12-lap run of 5:19.49, which was right on Hirosaka's heels. The fourth round didn't put any newcomers in the A-Final but, in the fifth round, Kyle Reed blistered the track with the

new Losi car, and he turned in a run of 12 laps in 5:15.27! The qualifying for the day ended with this round, and the drivers returned to their hotels to look for ways to run faster.

The next day, Hirosaka

showed everyone why he had earned the title of World Champion. In the final round of qualifying, he drove Associated's new Stealth car to the TQ spot with the fastest run of the competition—12 laps in 5:10.49. In fact, seven of the 10 drivers who qualified for the A-Final, made their best times in the sixth round. If the qualifying was any indication of what to expect in the Final, it was going to be heads up all the way!

2WD A-FINAL

In the first leg of the 2WD A-Final, Hirosaka traction-rolled in the first turn, paving the way for Reed. Fifth-place qualifier Mark Pavidis and 7th-place qualifier Kevin

2WD 17MAR Worlds Champions

Fin.	Name	Country	Chassis	Motor	ESC	Radio	Batteries	Charger
1	Masami Hirosaka	Japan	RC10	Reedy	Novak	KO Esprit II	Yokomo	Yokomo YZ-720E
2	Rick Vehlow	USA	RC10	Reedy Mr. T	Novak M1c	Airtronics C52P	Reedy Matched	Novak
3	Kyle Reed	USA	Losi Double X	Trinity	Novak M-5	KO Propo	Trinity Pushed	Victor Super IQ
4	Kevin Moore	UK	Schumacher Cougar	LRP	LRP	KO Propo	LRP	Schumacher PCS
5	Mark Pavidis	USA	RC10 Prototype	Reedy Mr. M	Novak M1c	Airtronics C52P	Reedy SCE	Novak
6	Jurgen Lautenbach	Germany	Schumacher Cougar	LRP Blue SE	LRP LE-25A	KO EX-1	LRP Oberle Sechs	Schumacher PC-5
7	Satoshi Maezumi	Japan	RC10 Team	Atlas 14D	Force	KO Propo	Atlas Panasonic	KO Propo
8	Scott Montgomery	USA	Traxxas	Peak Perf.	Novak	KO Propo	Team Orion	Victor
9	Craig Drescher	UK	RC10 Stealth	Reedy MRT	Novak M1c	KO Propo	Keil	Novak
10	Derek Furutani	USA	RC10	Peak Marauder	Novak M1c	KO Propo	Team Orion SCE	Novak Peak Plus

Body	Front Tires/Compound	Rear Tires/Compound	Sponsors
Yokomo	Yokomo TF-330	Yokomo TR-32	Associated, Yokomo, Reedy, Novak, Airtronics, Oakley, Pro-Line, Jammin' Jay
Yokomo Works '91	Yokomo TF-330/Soft	Yokomo TR-32/Soft	Yokomo, Associated, Reedy, KO Propo, Novak
Turbo Optima Mid	Kyosho Dir Pin	Kyosho Mini Pin	Team Losi, Trinity, Futaba, Kyosho, Novak, Victor, Jammin' Jay
Kyosho Optima mid	Kyosho Dir Pin	Kyosho Mini Pin	Trinity, Kyosho, Team Losi, Tecnacraft
Yokomo Works '91	Yokomo TF-330/Soft	Yokomo TR-32/Med	Miwa Hobby, Team Atlas
Stock	Pro-Line 7036	Pro-Line 7012	Reedy, Associated, Pro-Line, SRS
Lazer	Kyosho Staggered/Hard	Kyosho Pin Spike/Med	Twister, Kyosho, Novak, Robinson Racing
Schumacher PCS	Yokomo/Med	Yokomo/Med	Schumacher, LRP, KO Propo, Moore's Performance House
Stock	Yokomo TF-330	Pro-Line 7012	Associated, Reedy
Kyosho	Kyosho H/Med	Kyosho Pin/Med	Race Prep, Kyosho, Novak, KO Propo, Team Losi

Moore were the only two within striking distance, but Reed's car worked so well that all they could do was battle for 2nd. Reed coasted to the win with 12 laps in 5:16.71.

The second leg was more promising for Hirosaka. He was out in front, trading paint with Rick Vehlow, who was also driving a Stealth car. Hirosaka made a bobble, and Vehlow jumped into the lead. Although Reed had gotten caught up in the 1st-turn "mal-aise" and been knocked back, he set the track on fire trying to catch the front runners. Vehlow and Hirosaka duked it out to the finish, but Vehlow's brilliant run was too much for the defending champ, who had to settle for 2nd. Reed finally



Kyle Reed just had to have Masami's autograph after the Finals were over.

managed to pass Moore's 5-foot-wide (or so it seemed!) Schumacher car for a 3rd-place finish.

The 3rd leg of the A-Final was a toss-up for the title. Reed was in the best position with his 1st- and 3rd-place finishes, but Vehlow and Hirosaka were also in the race with their 1st-place finishes.



For either of them to win, they had only to finish this leg in 1st or 2nd with Reed in at least 3rd place. Although he'd have to win this leg to take the title,

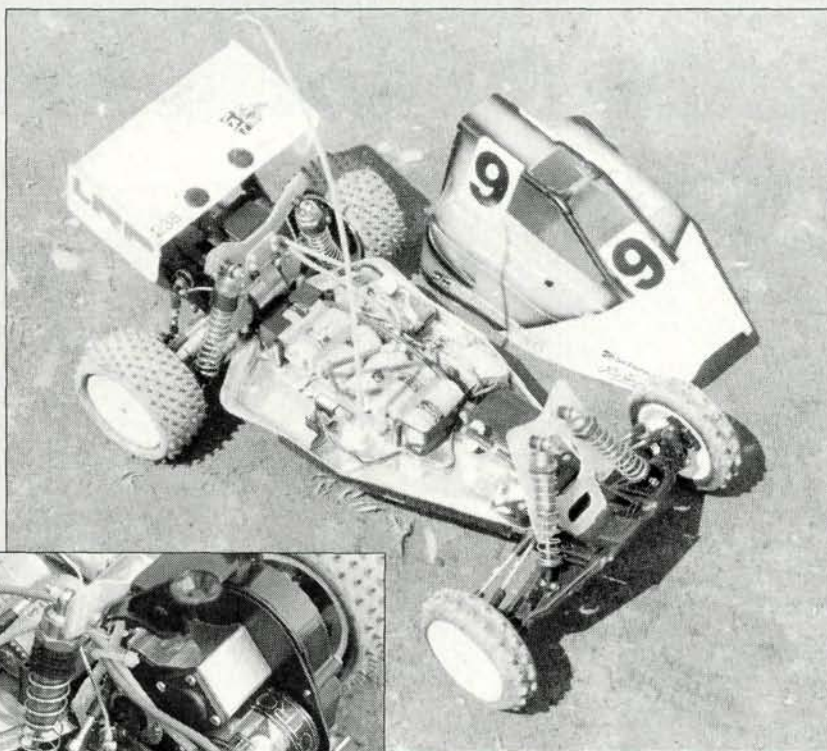
Pavidis was also in the running with his 2nd-place finish in the first round. Kevin Moore was a long shot; to take the title,

(Continued on page 52)

Body	Front Tires/Compound	Rear Tires/Compound	Sponsors
Viper	Yokomo TF-330	Yokomo TR-32	Yokomo, Associated, Reedy, KO Propo, Novak
RCPS Turbo Mirage	Yokomo TF-330/Med	Yokomo TR-32/Med	Associated, Reedy, Yokomo, Novak, Airtronics, RCPS, Lunsford, Pro-Line, Comp Electronics
Losi Double X	Losi Mumbos/HT	Losi Mumbos Rears/HT	Team Losi, Trinity, Novak, KO Propo, Magic Motorsports, Jammin' Jay
Cougar	Yokomo/Med	Yokomo/Med	Schumacher, LRP, KO Propo, Moore's Performance House
RCPS Turbo Mirage	Yokomo	Yokomo	Associated, Reedy, Yokomo, RCPS, Oakley, Team Moo, Airtronics, Novak
Schumacher Cougar	Yokomo 320/Med	Yokomo 32/Med	LRP Electronics, Schumacher, KO Propo
Viper Protech	Dynamite/Soft	TR-32/Soft	Atlas, Yokomo, KO Propo, Miwa Hobby
Traxxas	Schumacher/Blue	Pro-Line	Traxxas, Peak Perf., Team Orion, Novak, Pro-Line, KO Propo
Turbo Mirage	Yokomo TF-330/Med	Yokomo TR-32/Med	Reedy Associated, Yokomo, Keil, Novak, KO Propo
RCPS Mirage	Schu. 2x20 Stud/Blue	Pro-Line 7012 Proto	Peak Performance, Associated, Novak, Team Orion, RCPS, KO Propo, Team Moo

TECHNOMO

It's not unusual to see trick merchandise at large events, but the Worlds featured some of the most "radical" trick stuff imaginable. After all, it's the biggest off-road car event in existence, and it only happens every two years!



▲ *Schumacher's Cougar had many prototype parts, including new shock towers.*

▲ *Aluminum slider shafts deliver power to the rear more smoothly and accurately.*



There was a lot of new electronic equipment. Yokomo and Associated drivers used Yokomo's new, very small auto peak chargers with built-in meters. There are two versions: one has an analog meter, and the other, a digital meter.

Schumacher demonstrated its Ni-Cd Management System (NMS), which features programmable cell charging and discharging of up to 10 amps. The NMS can cycle packs as many as nine times and store the highest discharge capacity in its memory. (Stay tuned for a review!)

Many drivers at the Worlds used KO Propo's new EX-1 radios. They have many interesting features, including removable grips and trigger pads that come in different colors.

Although Corally doesn't make off-road cars, company owner J.V. Kooy was at the Worlds to watch the racing. Several drivers used Corally's new electronic speed controllers with torque limiting. These three-wire, high-frequency ESCs feature removable switch and receiver-wire harnesses that make it easy to adapt to any car or radio.

An Australian company, Force 7, also showed an ESC, and it caused quite a stir. It doesn't have any trim potentiometers, only buttons. To change the settings, you enter code numbers on its keypad and, believe it or not, when you turn the controller on, it plays the theme song from *Close Encounters*! It didn't have a speaker: the sound came from the car's motor—no joke!

After two years of preparation, every manufacturer demonstrated a new car. Kyosho brought two: the 2WD Triumph and the 4WD Lazer ZX-R. The Triumphs were basically the same as the one reviewed in the October '91 issue, though some had anodized motor plates and Teflon-coated shocks to increase

their durability. Based on the ZX, the Lazer ZX-R features a new body, a slipper clutch much like that used on the Triumph, longer front shocks, ball diffs and a one-way front drive system. Some had custom 6-cell chassis in which the cells were installed toward the rear, and some had experimental diff pulleys that used $\frac{3}{32}$ diff balls.

Yokomo 4WD cars were out in force. Some were similar to the YZ-10, which is distributed by Associated, but others were of the '91 Works variety. (It will be some time before the Works car reaches our shores; Yokomo isn't com-

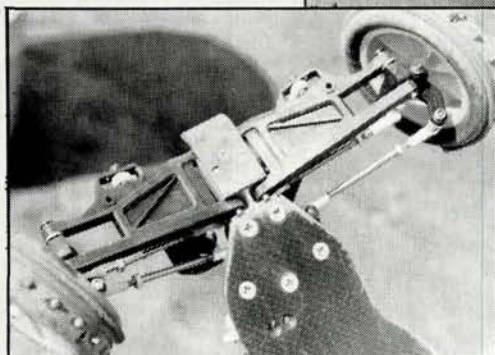
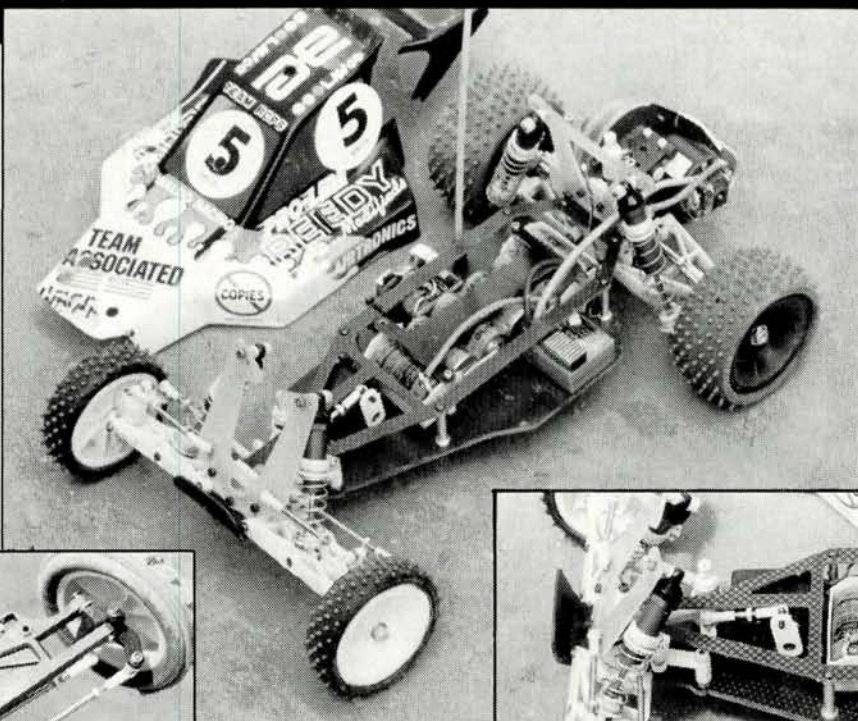
TION

pletely satisfied with it.) The cars had many prototype parts and set-ups, including new shock geometries, new shock towers and narrow front bulkheads that accommodate longer suspension arms.

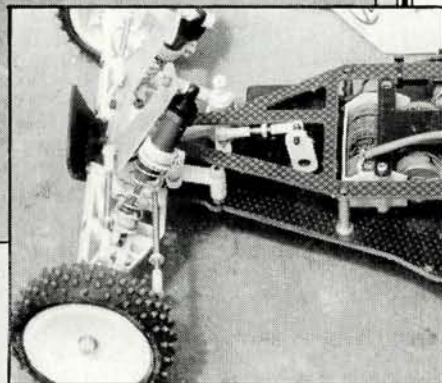
Associated was also competition-ready with a car similar to the Stealth car that was used in the '89 Worlds in Australia. At first glance, however, it looked as if it had been assembled backward! Its front shock tower is mounted forward on the bulkhead, and its shocks are mounted behind the tower. (I've only seen this setup once before, and it was done by mistake!)

Associated definitely did its

Italian driver Umberto Pernice's car featured an ultra-narrow front end with Yokomo arms.

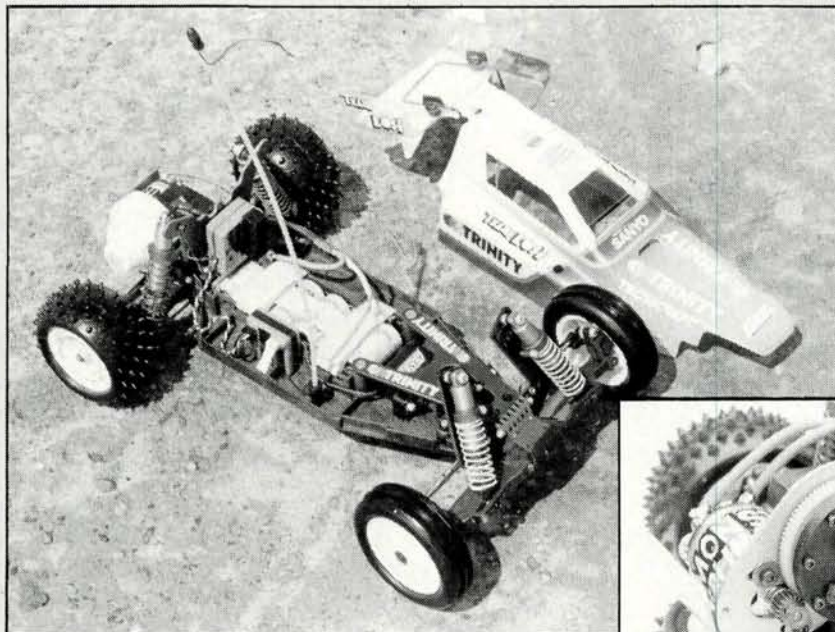


▲ *Associated's Stealth car. Notice its front suspension setup and the upper chassis plate (right).*

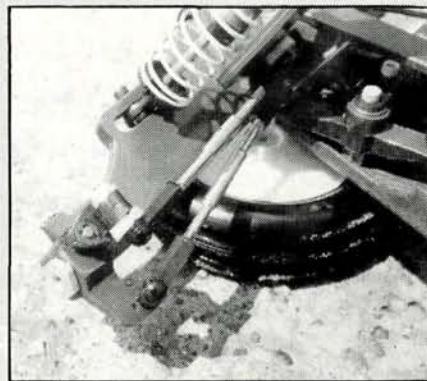


homework for this car and, boy, did it show! To make it more rigid, the graphite chassis has an upper deck. The car's rear is narrow; its new rear-arm mounts are well in to accommodate longer arms that maintain the maximum width; and

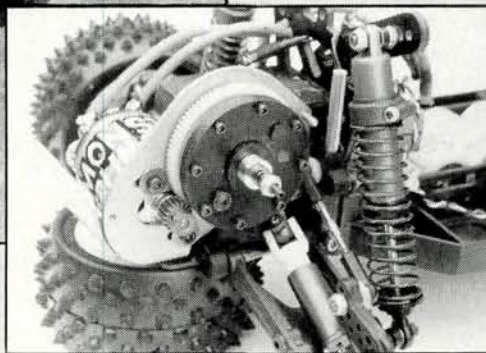
its chassis is notched to allow the rear arms to move freely. Let's hope this car hits the market! If it doesn't, perhaps others will follow Italian driver Umberto Pernice's lead and make their own "Stealth" cars. Umberto used Yokomo arms



Above: Although it's based on the Junior Two, Team Losi's new car has many new parts.



▲ *Ball bearings for the front wheels are in the steering arms. The new front arms are made of a solid plastic material.*



▲ *Losi's unique "fluid" slipper clutch is bolted to the spur gear. It's used with a standard friction-type slipper clutch.*

The most serious threat to Associated came from Team Trinity/Losi's new 2WD car.

he'd have to win this leg with all of the leaders in the back of the pack. Needless to say, the final-leg tension was so thick, you could have cut it with a knife.

At the start, Hirosaka was in the lead, with Vehlow in 2nd. Reed got caught in the first-turn pileup, and this seemed to squash his hopes for the win, but he charged through the pack to 3rd place. Reed had only to pass Vehlow to seal his victory. In the Surf's Up section, Vehlow's car flipped and was upside-down just as Reed came up for the pass. Reed got



Moo droppings?

too close to Vehlow's car, and his car hooked a wheel on it. This stopped Reed, but at least his car was still top-side-up and heading in the right direction. Surely he would get on the throttle to take 2nd place as soon as the marshal picked up Vehlow's car? In the process, however, the overzealous marshal flipped Reed's car. Vehlow's car was set down, and while Reed was being marshalled, Moore slipped into the 3rd slot. Reed was at Moore's back door for more than three laps. He waited for an opportunity to pass, knowing that he had to get in front of Moore and Vehlow for the win. Reed finally saw his chance, but when he stuck his car's nose in to pass, Moore slammed the door, causing

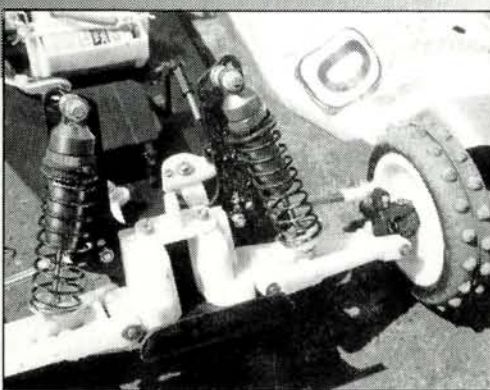
TECHNOMOTION

on the front of his RC10 for the ultimate narrow front end!

Losi's new car—dubbed the "Double X" by some team drivers—also performed strongly. Although it's based on the Junior Two chassis, it features several innovations. The chassis' front end is hinged so that front kick-up can be adjusted. The car also has new front arms and front steering blocks with "live" axles much like those used on the Corally cars. The Double X's most interesting feature, however, is its "fluid" slipper clutch, which is used with a standard slipper. We aren't sure exactly how the fluid slipper works, but we plan to find out and keep you posted.

The Schumacher cars had new goodies, too. Many of their suspension components and some of their rims were made of a new, *extremely* rigid plastic that's strong, yet light. Schumacher also tested new shock towers that were designed to cope with the rough track. To increase their reliability and make their performance smooth, some of the cars used aluminum-slider drive shafts instead of the standard molded-plastic ones.

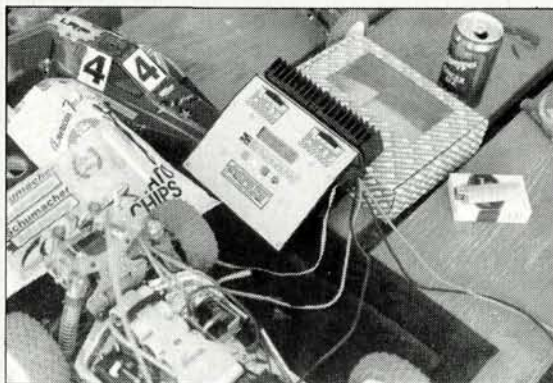
Traxxas's new 2WD car—the TRX-1—really made a name for itself. It looks like the Blue Eagle, but it has several new parts: a gearbox that's designed specifically for use with the new differential; front and rear arms that are as long as possible to provide maximum suspension travel; and a unique new body. Although some of the cars used hard-coated shocks, Traxxas



Traxxas's new 2WD car features a narrow front end with Blue Eagle suspension arms.

might not offer them to the public.

Tamiya's latest wares include super-modified 4WD Manta Rays and 2WD Astutes. Some of them had graphite chassis, prototype trannies and slipper clutches.



Schumacher drivers used the Ni-Cd Management System charger/discharger.

It would be impossible for me to fully describe every innovation and new product that was introduced at the Worlds without taking up the entire magazine! I hope that I've given you more than just a taste, though!



Yokomo's new peak charger comes in two versions: one has an analog meter (shown); the other, a digital meter.

KEEP ON TRACKIN'

Off-road racing means just what its name implies—racing off the road's paved surface. Generally, the vehicles run on a dirt track that has bumps and turns. The SEMROCC track—site of the '91 World Champs—is one of the most demanding courses in the world. It challenges every part of the car, from its wheel bearings to its chassis plate.

The 170x170-foot track has a sand base and a sifted-soil surface. Its elevation varies (there are places



where it's as high as 6 feet), and it has several challenging jumps. Between the jumps, there are agitators (little bumps), which are formed naturally, and they keep the cars' suspensions working hard.

During the Worlds, many comments were made about the track conditions, and some of them were critical. The complaints included, "Australia was much more consistent," and other, similar statements refer-

ring to the track in England. I don't think that the tracks in Romsey or Sydney were representative of most off-road racetracks; off-road races weren't meant to be run on dirty concrete! Yes, the conditions in Detroit varied, but that's dirt racing, my friends!

The SEMROCC crew worked tirelessly to groom and maintain the track; no effort was spared to keep it as consistent as possible. Five rounds of qualifying, however, were crammed into the first day; the last round of qualifying, a full round of practice runs and the Finals were all held on the second day. Although there were only 120 drivers, the rigorous schedule allowed little time for maintenance. Perhaps the event should be extended by two days (as proposed at the IFMAR general meeting) so that the qualifiers could be run over two days and a day could be reserved exclusively for the Finals. This would give crews much more time to perform the necessary maintenance, and it would give drivers more opportunities to run on a clean track.

Every race has winners and losers, and exaggerated complaints about the track conditions are usually just sour grapes. Many racers regularly face the same (or worse) conditions as those at the Worlds. Those who blame poor race results on track conditions are drastically underestimating their abilities to adapt to change.



Here's Nosram Electronics' new atomic-FET ESC! Actually, it was just a joke made with a bunch of pennies and some tape.

both cars to tangle! As the clock wound down, Hirosaka

IFMAR Off-road World Championships! Although much of the attention is

blazed a fast trail to the win followed by Vehlou and Reed, who had recovered from his encounter with Moore. Hirosaka was the two-time 2WD-Class Off-Road World Champion!

Congratulations to all who raced in the '91 Kyosho/Trinity

focused on the top finishers, even qualifying to race in this prestigious event makes winners of all who participate. Thanks must go to the people behind the scenes, too: John Thawley who organized the event, the SEMROCC crew for their tireless track maintenance and, of course, the sponsors—Kyosho and Trinity—whose support helped to make this event possible. ■

The club's original drivers' stand had to be torn down because it didn't meet the building code. The city provided a flatbed trailer until the new drivers' stand was completed.



ONE OF the biggest problems facing R/C car clubs is finding a permanent race site. Most nonprofit clubs look for donated space, but the choices are few and far between. I hope that the trials and tribulations of my club—the Coral Springs Roadrunners R/C Car Club—will provide other clubs with insight into the process of establishing a rent-free, permanent facility.

The city of Coral Springs, FL, offers almost every recreational activity imaginable. Land is expensive, however, and

R/C clubs can't afford to buy, or even rent, an area large enough to accommodate an outdoor off-road track. Fortunately for our club, city officials agreed to add off-road racing to their list of recreational activities.

The Coral Springs Roadrunners R/C Club was established in 1985, and for the last several years, races have been held in a large, popular sports park. Not too long ago, our club was asked to relocate within the park to make more room for the more popular sports. Although club members were grateful for the

new site, it meant starting from scratch and building a combination drivers' stand/radio-impound facility and a new track.

A formal agreement (called "Adopt a Park") was drawn up in which the responsibilities of the club and the city were specified. The club could develop the site as long as it complied with city laws and building codes. Also, to eliminate any liability problems, the city was added to the club's ROAR insurance policy. Sounds simple enough, right? This is where the fun started.

The club was at its

Set up a racetrack with the help of local government

• • •

new location for about a year when I wandered onto the scene. As a newcomer to R/C racing with no other meaningful hobbies, I immersed myself in the club's activities. Eventually, I was appointed to the board of directors where I assumed my responsibilities would be limited to race-day activities. One day, I asked what I thought was a simple question: "Hey guys, why can't we get electricity out here?" After several negative responses, I said I'd look into it. How difficult could it be? We

were only 250 yards from the nearest electrical hookup. After I had contacted several contractors, and they had submitted bids ranging from \$5,000 to \$10,000, I went to the club members with the bad news: we just couldn't afford it. The club has a decent income, but it all goes into trophies and track maintenance.

CITY LIMITS

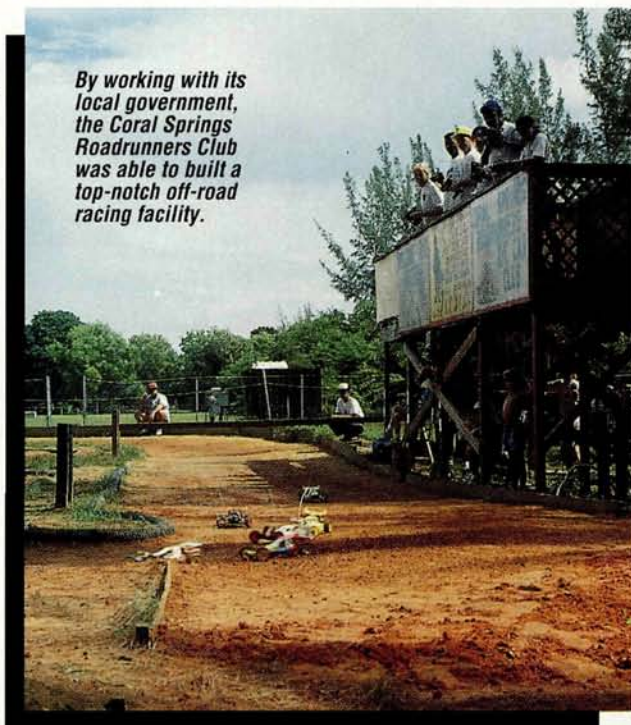
Then an idea hit me! Maybe the city would help. Our initial request to the Parks and Recreation Department for

(Continued on page 136)

You Don't Have to Fight



A well-run, family-oriented R/C club like the Roadrunners attracts many racers and spectators.



By working with its local government, the Coral Springs Roadrunners Club was able to build a top-notch off-road racing facility.

to WIN

by RICK SCHWARTZ

Cheap Thrills

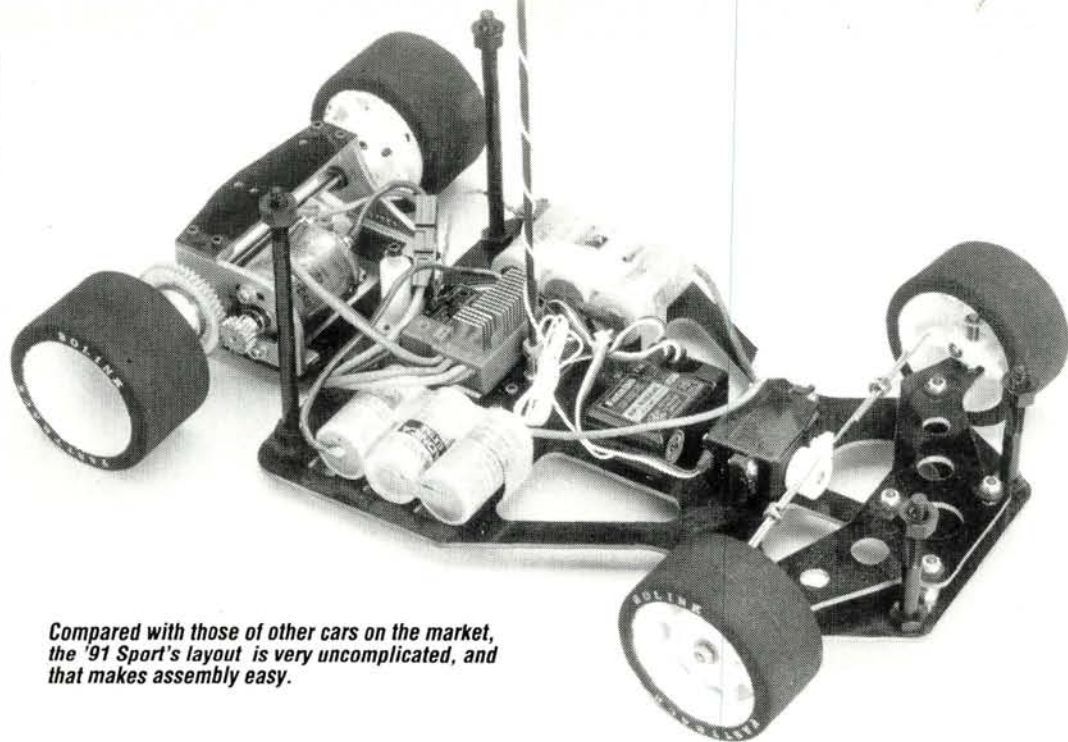


BOLINK '91 SPORT

IN THE SEPTEMBER '89 issue, I reported on a new entrant in the on-road racing-car market—Bolink's* Eliminator Sport—which was about to make a large impact on the budget-conscious. Using its proven racing technology, Bolink had come up with a sport-class kit that would allow average R/Cers to enjoy on-road racing without the big-buck extras.



b y F R E D M U R P H Y



Compared with those of other cars on the market, the '91 Sport's layout is very uncomplicated, and that makes assembly easy.

'91 SPORT

Now Bolink offers another Sport, and like the Eliminator, the '91 Sport is available in two versions: with electrics (mechanical speed controller and motor) and without them. My review kit was the second type—a rolling chassis only. Choice of motor, speed controller, batteries and radio system was left entirely to me.

THE KIT

The '91 Sport kit has a black fiberglass chassis (to which the front axle, rear

brace, radio tray and T-plate are attached), Bolink's Buick Grand National body, a set of tires mounted on one-piece rims, a steel axle with ball differential, a fully adjustable front suspension and Oilite bushings for wherever they're needed. The most impressive change is that the '91 Sport has aluminum motor mounts; the original Eliminator Sport had mounts made of nylon. Also important is the improved rear suspension that goes with the new motor mounts. The '91 Sport has a

vertical silicone-tube damper, whereas the Eliminator Sport relied on a T-nut and a rubber grommet to handle damping.

ASSEMBLY

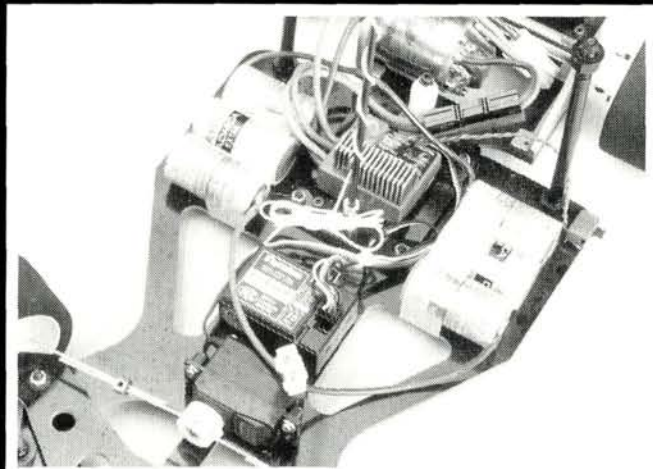
According to the instructions, assembling the '91 Sport is a relatively simple 10-step process. (A supplementary page describes the installation of the motor mounts and the vertical damper.) Even beginners should be able to assemble the kit in about two hours, after which time you should

have a complete rolling chassis that's ready for the installation of the radio and the battery. After that, it's time for body preparation. (Take your time. This is what your fellow R/C addicts will see first.)

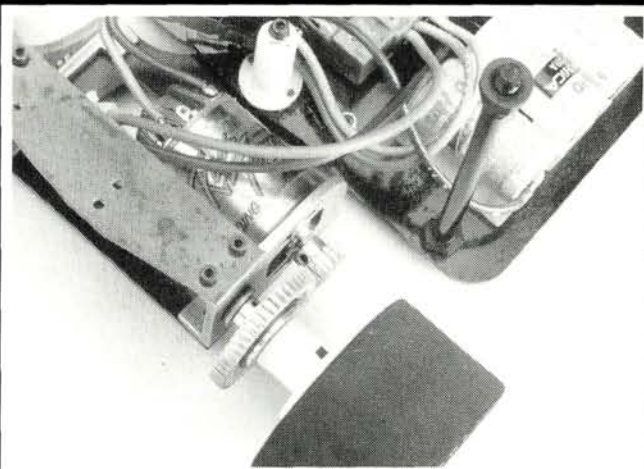
The instructions give helpful hints on body painting, assembling your own saddle-pack batteries and modifying the car to take servos other than the Futaba S-132H and the Novak NES-1A, for which the '91 Sport's chassis has been drilled.

There are five pages of

(Continued on page 64)



All the radio gear fits in the center of the '91's chassis, and the batteries fit into slots on the sides of it.



The '91 Sport's rear end resembles those on the earlier Eliminators, but instead of using a shock, the '91 has a white, silicone-tube damper that's just in front of the motor.

BOLINK '91 SPORT

Type On-road
 Scale 1/10
 Price \$99.95 (without electrics)
 (\$129.95 with motor and speed controller)

DIMENSIONS:

Overall Length 18.25 inches
 Width 9 inches
 Wheelbase 10.185 inches
 Track (f/r) 7.25 inches

WEIGHT:

Gross (with battery) 44 ounces

BODY:

Type Buick Grand National
 Material Polycarbonate

CHASSIS:

Type Pan
 Material Fiberglass

DRIVE TRAIN:

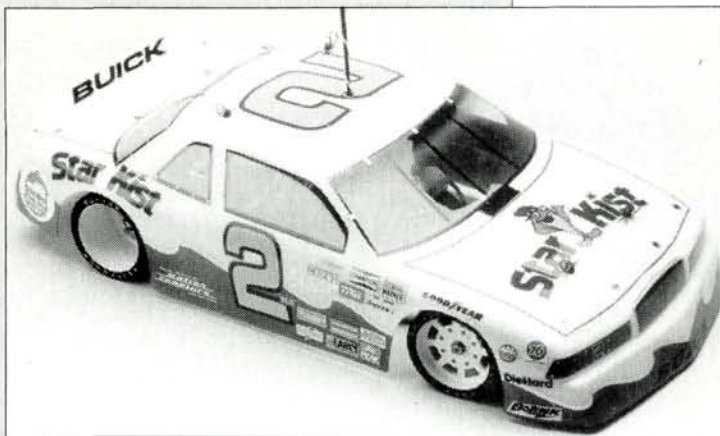
Primary Pinion/spur
 Transmission None
 Differential Ball diff
 Bearings/Bushings Oilite bushings

SUSPENSION:

Front: Type Fiberglass crossbar
 Damping Coil-spring
 Rear: Type T-plate
 Damping Silicone tube

WHEELS:

Front: Type One-piece plastic



Dimensions (DxW) 1.875x1.25 inches
 Rear: Type One-piece plastic
 Dimensions (DxW) 1.875x1.5 inches

TIRES:

Front/Rear Low-profile foam

ELECTRICS:

Motor Bolink stock motor*
 Battery 6- or 7-cell stick or saddle pack†
 Speed Controller Mechanical*

OPTIONS TESTED:

Futaba Magnum Junior radio and S132H high-speed servo; Tekin TSC 410S speed controller; Race Prep 14D modified motor; Sanyo 1700 SCE saddle pack.

COMMENTS:

The Bolink '91 sport is the updated version of the performance-proven Eliminator Sport. The aluminum motor mounts and the silicone-tube damper greatly improve performance, but the price remains the same. More for your money; this sounds like an economic breakthrough to me!

* included in \$129.95 version
 † not included

but the '91 Sport took almost everything I could put to it.

Novice racers will find its handling more than adequate. Only a slight rear-end drift showed up when it entered a turn too fast, and adding a set of wing mounts and a wing would cure this. The side-roll adjustment screws allow you to adjust its cornering characteristics by redistributing weight to one side. Unlike many sport-level cars, this flexible Bolink design lets you adjust the car's handling.

Beyond this basic, out-of-the-box performance, Bolink offers you the chance to convert the '91 Sport into a full-bore racing Eliminator. You can install a thinner T-plate, a full rear-shock assembly—even a light, one-piece rear pod. The '91 Sport was designed with growth in mind: both the car's and yours. No wonder the "good ol' boys" are such an impressive force in Grand National racing!

*Here are the addresses of the companies mentioned in this article:

Bolink R/C Cars Inc., 420 Hosea Ave., Lawrenceville, GA 30245.
Tekin Electronics, 970 Calle Negocio, San Clemente, CA 92672.
Sanyo Electric, Battery Division, 200 Riser Rd., Little Ferry, NJ 07643.
Race Prep, 20115 Nordhoff St., Chatsworth, CA 91311.
Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718. ■

black-and-white assembly photos, a list of replacement and optional parts, and a very interesting page titled, "Racing your Eliminator." This short article gives set-up tips that both novices and experienced racers will find valuable. The tips include info on everything from fine-tuning caster to side roll and the "amount of twist" the T-plate has in relation to the chassis. Even the front springs get attention, and there are recom-

mendations on tire and traction compounds too.

PERFORMANCE

My version '91 Sport didn't include electrics, so I added these items: the Tekin* TSC 410S speed controller, a saddle-pack battery consisting of six 1700 Sanyo* SCE batteries, a Race Prep* 14-turn, double, modified motor and the Futaba* Magnum Junior with an S132H high-speed servo. The kit included tires and

wheels and Oilite bushings, which I didn't change, because I wanted to see how the car would perform out of the box.

After a few warm-up laps, the '91 Sport started to show its real colors. Maybe I should put that another way: it started to show its real colors if I could have seen them as it sped by! The '91 Sport's speed was impressive. Granted, much of the credit for that goes to the motor and the batteries,

INTRODUCTION

CUSTOM • WORKS

TO ME, NOTHING is more fun than R/C racing on a dirt-oval track. The sliding cars, the flying dirt—it's as close to full-size racing as you can get! More and more wedge-style bodies that match their full-scale counterparts are available. It's easy to pick a favorite car/driver combo to recreate in 1/10 scale.



by JIM DAHL

Great Balls of

FIRE

Though it's possible to run an off-road car with a wedge-style body on a dirt-oval track without changing the car's basic components, it's seldom done. Dirt-oval racers modify their cars in many ways: they add foam or mini-spike tires; they mount batteries on the left side only; they use short shocks all around (set at a lower angle for more progressive damping); and they often use a graphite pan chassis. With these modifications in mind, several companies now offer conversion kits. These after-market offerings range from a few key parts for a particular car to kits that include almost everything. Custom Works* has finally introduced the Intimidator—one of the only complete 2WD dirt-oval kits on the market today!

THE KIT

Most of the parts you'll need to build the Intimidator are included. (There's no motor, radio, speed controller or batteries, of course.) The chassis and many bags of components and hardware came nestled in the Phantom Wedge body. A black-and-white instruction manual takes you step by step through the assembly, but there's virtually no information about car set-up and adjustment for on-the-track performance. Separate instruction sheets are included for several of the sub-assemblies, e.g., the differential and the shocks.

The graphite and aluminum parts were machined perfectly, and the well-finished, molded-nylon fit almost perfectly. All the required hardware was included, and so were

some spares (in case you're careless and irretrievably drop some screws or another small part).

ASSEMBLY

● **Getting started.** I had a little difficulty getting the screw started in the antenna base, so I ran a 4-40 tap through the hole, and this allowed me to thread the screw in easily. When securing the body posts to the chassis, hold them tightly. I found that I could tighten and align the body posts better by sliding an Allen wrench through the body-pin holes.

● **Battery cradles.** The Intimidator comes with unique vacu-formed battery cradles that are light, sturdy and have two straps that hold the battery packs in place. This system makes a stiffer, sturdier chassis, because there



aren't openings for the cells. There is, however, the extra weight of the straps, the buckles, the four aluminum bars, the screws, the cradles and the material that hasn't been removed from the chassis.

Study the cradles thoroughly before you carefully trim away the flanges. Remember: any cuts or nicks in the edge of the polycarbonate may cause tearing later. Here—and wherever a metal screw is threaded into a metal part—use a small drop of Blue Loctite* 242 to secure the screw. To mount the battery cradles and straps, I used 3/4-inch screws instead of the ones supplied with the kit, which I felt were too short. I used slot-ted flat-head screws, which I prefer to the tiny,

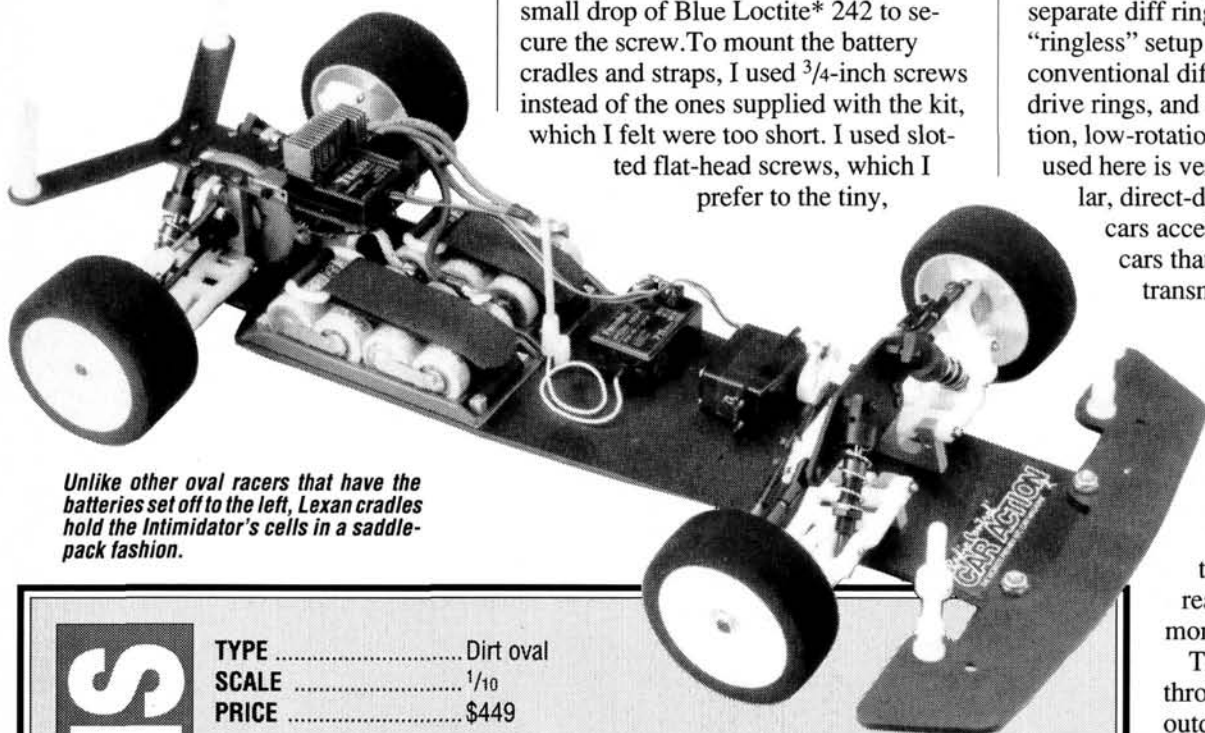
Allen, socket type that can be stripped easily.

● **Diff assembly.** The Intimidator's diff has a few features worth noting. First, it's a direct-drive design. The main steel hubs ride directly on the balls with no separate diff rings. Diffs with this "ringless" setup will usually outlast conventional diffs that use separate drive rings, and the compact, low-friction, low-rotational-mass configuration used here is very common in the popular, direct-drive class. Direct-drive cars accelerate more quickly than cars that use gear-reducing transmissions.

On the down side, using this particular type of differential limits your choice of gear ratios, and it excludes you from classes that require transmissions. In addition, motor selection and rear tire diameter become more critical.

The diff can be adjusted through the left-hand outdrive after you've removed the upper link and dogbone. If you need to replace the spur gear or work on the diff, you'll have to disassemble the entire rear end, owing mainly to the large, 96-tooth, 48-pitch spur gear that passes through the chassis and the graphite top plate. I found it easier to service the diff if I first loosened the two outdrives, removed the bottom screws from the two suspension mounts and the motor plate, and then removed the upper screws from the two suspension mounts.

There are two bearings for the differential, one of which (the 3/16x5/16-inch bearing) is supposed to be press-fit into the spur gear. Contrary to the instructions, I found that this inhibited proper diff action. To remedy this, I slightly reamed the gear's center hole to allow *very slight* side-to-



Unlike other oval racers that have the batteries set off to the left, Lexan cradles hold the Intimidator's cells in a saddle-pack fashion.

SPECIFICATIONS

TYPE Dirt oval
SCALE 1/10
PRICE \$449

DIMENSIONS:

Overall Length 21 inches
Width 9 inches
Wheelbase 11 inches
Front Track 7.9 inches
Rear Track 7.8 inches

WEIGHT:

Gross (with battery) 3 pounds, 8 ounces

BODY:

Type Dirt-oval wedge
Material Polycarbonate

CHASSIS:

Type Plate
Material Graphite

DRIVE TRAIN:

Primary Pinion/spur
Transmission Direct drive
Differential Ball
Bearings/Bushings Ball bearings

SUSPENSION:

Type (f/r) Lower A-arm/up per control link
Damping (f/r) Oil-filled, coil-over dampers

WHEELS:

Front:

Type One-piece plastic
Dimensions (DxW) ... 2x1 inches

Rear:

Type One-piece plastic
Dimensions (DxW) ... 2x1.375 inches

TIRES:

Front Blue foam
Rear Yellow foam

ELECTRICS:

Motor, Battery, Speed Controller Not included

OPTIONS TESTED:

Futaba PCM and 132H servo; Tekin 411P ESC; Trinity dirt-oval stock motor; Custom Works front sway bar and heavy springs; Team Losi black rear tires.

COMMENTS:

This is an extremely well-made car with some clever new features. Though this first complete dirt-oval kit has some design limitations, it's a performer. In the hands of experienced racers, it should see a lot of success.

side play. To work properly, the spur must float on the balls. When it's fully assembled, you should be able to rock the spur gear back and forth.

● **Suspension.** A-arms are installed on all four corners. Make sure they all move very freely and check them after you've run the car a few times. Suspension parts should move easily with the shocks removed. In Step 13, be careful to separate the single 2-56 ball end from the four 4-40 ball ends. I replaced the ball cup at the servo-saver end with a small ball link.

The shock absorbers are very different from the off-road type that most racers are used to. They're much smaller and they have to be filled from the bottom instead of the top. Take time to learn how they work, and pay attention to the instruction sheet. Don't use a tool to tighten the cylinder nuts; be sure that they're only "finger tight." These four shocks weigh 1 ounce less than a set of conventional shocks.

● **Wheels and tires.** The kit comes with blue-compound foam tires for the front and yellow-compound foam tires for the rear. These should be a good starting point but you might have to change them to suit your track.

● **Radio gear.** The installation of the electronics is very straightforward. Tape the servo (I chose a Futaba* 132) to the chassis on the left side of the clever new steering "rack." The receiver (I used a Futaba PCM) is attached farther back on the chassis, and the electronic speed controller (mine was a Tekin* 411P) is taped to the leading edge of the graphite top plate.

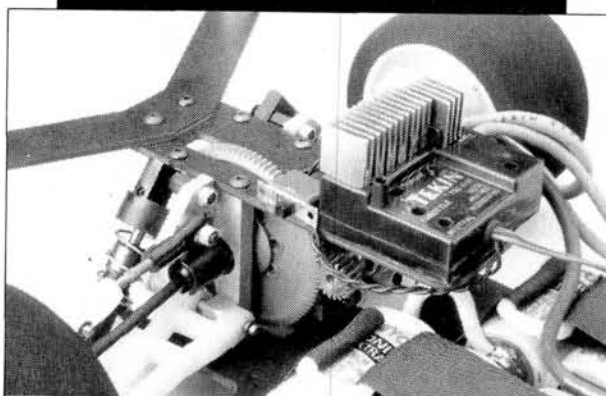
● **Body.** My Phantom Wedge body was a deep blue with bright orange and red flames on the front. It was painted by Scott Bich, of Bichin' Bodies* in Houston, TX.

PERFORMANCE

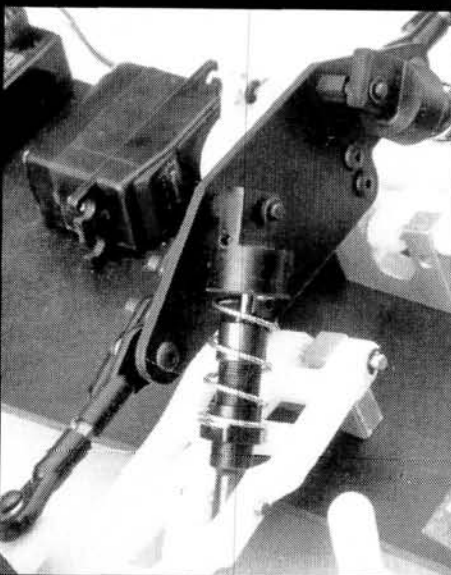
Finally, we're off to the track! (A&D's Fastracks in Brewster, NY—my favorite indoor track). The dirt oval there is relatively small, it has very low banks, a moderate percentage of clay and a surface that isn't perfectly smooth.

2WD stock-class cars usually turn 43 laps, and the record for 4WD modified cars is 49 laps.

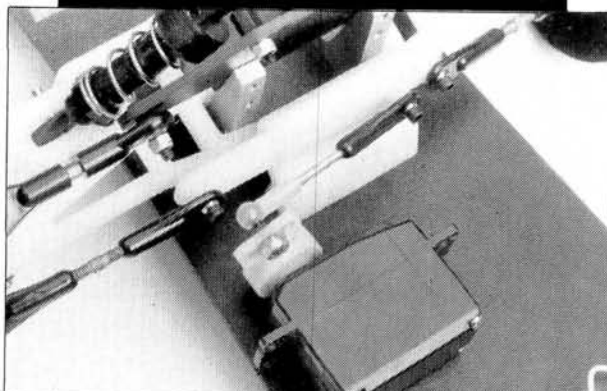
For a while, I struggled with shock



The Intimidator uses a direct drive to transfer power to its wheels.



The Intimidator has Delta shock absorbers on all four corners. For suspension, the car has single A-arms with upper control links, front and rear.



One of the Intimidator's unique features is its sliding dovetail steering system, which allows very smooth, slop-free steering.

springs and oil that proved to be too light, so I made some changes: up front, I installed an optional sway bar and large blue-compound tires (stock); in the rear, I installed small-diameter black rubber tires. I put 90WT oil in the front shocks, 120WT oil in the rear shocks, and optional heavy springs all around. I also positioned the side dam 1 inch farther back than the instructions suggested.

The car was definitely starting to hook up—touchy, but looking much better. Smooth driving seems to be very important; the car didn't respond well to my rusty technique. In went the next battery pack, and I handed the controls to one of the top local drivers,

Michael Valentine. We switched to a 6-cell battery pack and a stock-class motor, Mike adjusted the brake and steering a few times, and the car began to fly.

When the Mains were over, Adam (the owner of the track) set up the computer to see whether the car's time was in the ballpark. The record for this class is 45-plus laps. One week before in the A-Main, the first four cars ran 45 laps and finished only 5 seconds apart. Even though he had only run the car twice, Mike was game to give a timed run a shot. Four minutes later, I was greatly relieved to find he had only run 44 laps (I had said I'd give him the car if he ran 45!). During this test, the car ran six 5.1-second and 11, 5.2-second laps; it was definitely competitive! The following night Michael and I returned to run two 39-lap heats and a 43-lap Main.

The Intimidator is a completely new design that's winning big at races around the country. Although it may not be easy to dial it in to every track, I'm sure that racers with even marginal dirt-oval experience will be successful with this car.

** Here are the addresses of the companies mentioned in this article:*

Custom Works R/C Products, 3720 Easton Dr., Suite 7, Bakersfield, CA 93309.

Loctite Corp., 4450 Cranwood Ct., Cleveland, OH 44128.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

Tekin Electronics, 970 Calle Negocio, San Clemente, CA 92672.

Bichin' Bodies, 1516 Wroxtton Rd., Houston, TX 77005

SCOPING OUT

by JOHN RIST

SCI Pullman

THE GREEN MONSTER has arrived!—not Art Arfons' famous green jet-powered dragster, but SCI's* heavy-duty, green, truck-pulling speed controller (SC)—the Pullman. The Pullman has 12 FETs to handle the current. This high FET count gives it an advertised 1900A peak-current rating and a 470A continuous rating, and its voltage rating is 4 to 40 volts.

These high numbers should make this controller ideal for serious pulling machines. The 40V rating means that it should be able to handle the 28 cells allowed in an Open Class II pulling rig. Of course, no controller can handle 470

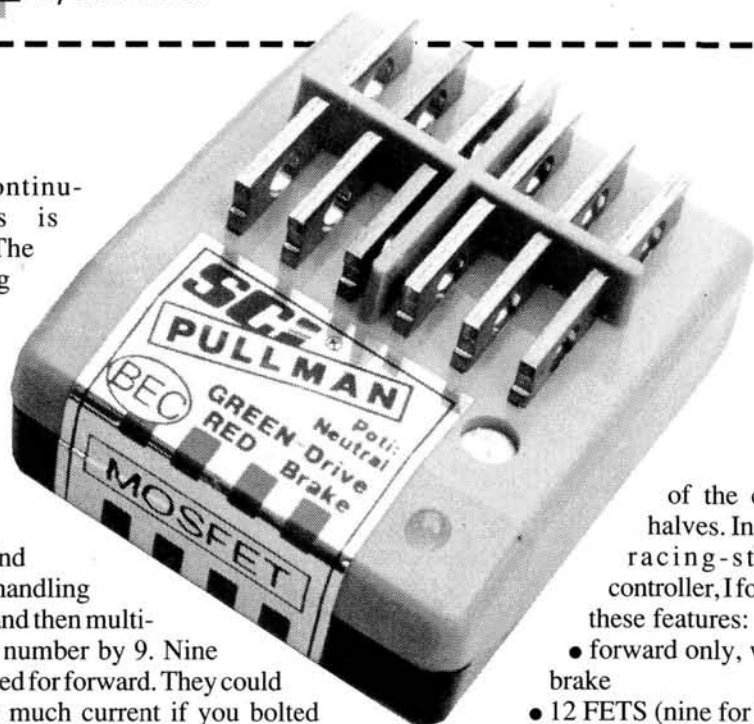
amps continuously, as is claimed. The 470A rating is derived by reading the manufacturer's specifications on one of the FETs to find its current-handling capability and then multiplying this number by 9. Nine FETs are used for forward. They could handle this much current if you bolted them to the hull of a battleship *below* the water line to keep them cool; but running them in air, or, at best, with a heat sink that's the size of a postage stamp, at 470 amps, they'd melt in seconds. And, of course, the wires and the printed-circuit board would melt or explode at 470 amps.

So why publish such unattainable numbers?—mainly for comparison. If you plan to do some serious truck pulling with several Cobalt motors, this high current rating guarantees that the FETs will handle the 100 amps that you'll hit at the start. Also, in general, high current ratings usually mean very low resistance ratings, and it's the *resistance* of a controller that causes unwanted voltage loss. The lower the resistance, the lower the voltage loss.

The SCI Pullman's advertised numbers were so good that I wanted to rush it to the lab to see whether it really had the heart of a green monster or just looked like one!

CHECK IT OUT!

I always look inside an SC to see what the manufacturer has provided for my green-backs. The Pullman was quite easy to take apart: I just took four screws out of the bottom and then took the innards out



of the case halves. In this racing-style controller, I found these features:

- forward only, with brake
- 12 FETs (nine for forward; three for braking)
- neutral set-point potentiometer (pot)
- built-in pulse checker
- pre-set full speed (no adjustment necessary)

This SC has a 4V to 40V capacity, so it should work with 4- to 28-cell battery packs. A Tamiya-style battery connector and a bullet-style motor connector are already installed, and it has a Futaba J-style radio connector. (Connectors for most of the other major brands of radio are available.) It also comes with an SCI Pullman decal and an instruction sheet.

When I look at an SC's components, I check for sloppy workmanship and anything else that could lead to a dreaded DNF (did not finish). Taking into account its 12 FETs, the Pullman is quite small, and when I looked inside, it was obvious how SCI has managed to keep its size down. Surface-mounted components are used in the control section, and this allows the use of very small parts that have been placed on both sides of the board. I would have preferred to see a slightly heavier solder bridging and, perhaps, FET leads that were bent over instead of cut off. These two "tricks" would have enhanced the SC's current-handling capacity. All the solder joints,

• THE SCOPING OUT LAB •

John Rist's lab consists of:

- an oscilloscope
- a digital voltmeter
- a resistor load bank
- a 6V 30A electricity supply
- a Pit Stop Radio servo/speed controller tester.

The oscilloscope is used to monitor the controller's output and to guarantee that it's fully on.

The digital voltmeter takes all the voltage-drop readings and verifies the reading on the current meter.

The resistor load bank consists of 40, 12-ohm, 5W power resistors, which can be switched on and off one at a time to vary the load between .6 amp and 20 amps, but the standard 12 amps are usually used.

In series with the resistors is a 25A Simpson current meter and a 1-percent .01-ohm resistor. By measuring the voltage drop across this resistor, the current-meter's reading can be double-checked. Of course, the lab power supply provides the test current.

however, looked very good—a great-looking electronic assembly. Good looks are fine if all you want to do is win concours, but it takes current-pumping capability to win races, so I headed to my "Scoping Out" lab.

VOLTAGE-DROP TESTS

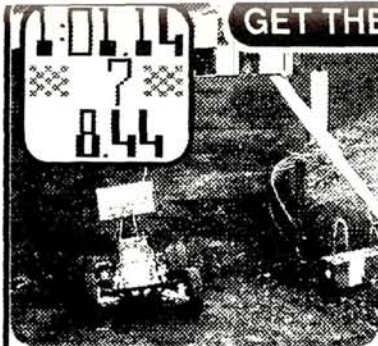
My first test is always the resistance test. It's almost impossible to measure the resistance of an electronic speed controller (ESC) directly, but the accepted way to determine resistance is to measure the voltage drop across the ESC while it's passing a known amount of current, and then use these numbers to calculate its resistance. I always take this measurement at two points: along the entire length of the battery and motor wires (including any connectors), and 2 inches along these wires. The first reading shows how the ESC performs as it comes from the factory; the second gives a standard resistance reading with which I compare the ESCs I test.

Passing 12 amps along the entire length of the wires (including connectors), the voltage drop was .13 volt—a calculated resistance of .011 ohm. Next, still passing 12 amps, I measured the voltage drop at the 2-inch point and found it to be .07 volt—a resistance of .0058 ohm. Considering that the Pullman will handle 28 cells (40 volts), these are impressive figures. High-voltage FETs tend to have a slightly higher resistance, but in the Pullman, SCI has overcome this by using nine of them wired in parallel.

LET-IT-COOK TEST

This test checks whether the controller can stand up to repeated 4-minute battery dumps without being fatally damaged. The Pullman didn't come with heat sinks, so I ran this test without them and without any cooling air from a fan. I set the resistor load bank to

(Continued on page 76)



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consume 20 amps and set the Pullman to full throttle. After 15 minutes (the equivalent of dumping three to four battery packs without a cool-down period), the Pullman was still pumping full current, and though the FETs were very hot, they were still well within safe operating limits.

DEAD-SHORT TEST

To run this test, I simply put a jumper wire across the motor leads to cause a dead short. I left the Pullman running at full throttle with the short forcing 46 amps (the limit of my power supply) through it. After 1 minute, I shut it down and checked for damage. The FETs were so hot that I burned my finger, and the case had actually started to melt where the FETs' metal tabs touched it.

I let the Pullman cool for 5 to 10 minutes and then turned it back on. It was still operating normally. The only apparent *minor* damage was to the case (but there was *major* damage to my finger!). If you use just a little common sense and check for problems when the car doesn't seem to be running properly, the Pullman should survive jammed gears, burned motors and the other misfortunes of racing.

NEW TEST—100 AMPS!

Because this controller's pedigree supposedly makes it suitable for the serious world of truck pulling, I decided to add a test to my usual "Scoping Out" procedures. This test is designed to see whether a controller can truly stand the 100 amps

SCI Pullman

DIMENSIONS:

Height 0.866 inch
Width 1.50 inches
Length 1.6 inches
Weight with wires 2.2 ounces

TUNING:

Access to controls Excellent
Ease of adjustment Fair

PRICE:

Sug. retail price \$198
Warranty 6 months

ELECTRICAL:

(Manufacturer's specs)

Max. voltage 40 volts (28 cells)
Min. voltage 5 volts (4 cells)

Max. current 1900 amps
Continuous Current 470 amps
Resistance Unlisted

TEST PARAMETERS:

Voltage 12 volts
Current 12 amps
Voltage drop along length of wires 0.13 volt
Voltage drop at 2-inch point 0.07 volt
Resistance to end of wires* 0.011 ohm
Resistance at 2-inch point* 0.0058 ohm
BEC voltage, 6-cell pack 5.68 volts
*Calculated resistance = Voltage drop/current

COMMENTS:

SCI of Austria has come to the USA with a line of exciting ESCs. Its big gun—the Pullman—is green and mean. It has a 28-cell voltage rating (40 volts) and nine FETs to handle the voltage and current required by serious pulling trucks. I had a little trouble adjusting it to match my transmitter, because it doesn't have a full-speed adjustment pot. I obtained full-open throttle by adjusting the neutral trim on my transmitter. The instruction sheet is skimpy, but adequate, although newcomers might need expert help. If you plan to use this controller for serious racing, the SCI-installed Tamiya bullet-style connectors must go. This controller has the potential to operate well in big, heavy, multi-motor pulling machines, but it's small and light enough to fit just about any 1/10-scale car or truck. All things considered, the Pullman is first class.

that a 28-cell Ni-Cd battery pack can deliver.

I rounded up 28 battered old cells, charged them and assembled them into a 28-cell battery pack. I ran about 20 feet of monster wire across the motor leads to simulate the amps drawn by several monster Cobalt motors. Considering the overheating I had encountered during the previous test, I decided to put heat sinks on the FETs, and I found that both Tekin and Novak heat sinks will fit the Pullman. It takes four heat sinks, however, because the Pullman has four groups of three FETs. The groups are separated by ribs that protrude from the case, and the instruction sheet warns you not to short the four groups. If you short the brake FETs to the other nine, you'll destroy the controller, so it's best to play it safe and use four separate heat sinks.

Also, for 28-cell operation, you must

cut the battery-eliminator circuitry (BEC) loop. This is a white wire loop that, according to the instruction sheet, can be cut in half to take an on/off switch. The instructions also warn that if you plan to use more than 12 volts (more than nine cells), you must cut this loop to disable the BEC. After doing that, you'll use a separate receiver battery to power the ESC, the steering servo and the receiver.

With the heat sinks in place and BEC loop cut, I jammed the pedal to the metal, and the current jumped to a scary 105 amps. Thirty seconds later, the current had dropped to 70 amps; and after 45 seconds, only 50 amps of current were

flowing. By then, the batteries were smoking hot, and some of the cells were spewing smoke out of their ends. Then the current abruptly fell to zero! A quick inspection revealed that one of the solder joints between two of the cells had melted, and the 28-cell battery pack was so hot that I could have roasted a hot dog over it! I quickly felt the heat sinks and found them only warm, not blistering hot as I had expected.

I reconnected the Pullman to my bench supply and found that it was undamaged—still able to handle the juice. I'm a little puzzled about why the dead-short test caused so much overheating. The most probable reason for it is that, when you load down a bench supply, the voltage drops so low that an ESC can't operate properly. The drive circuits to the FETs become "wimpy" and allow the FETs to turn off partially. This increases

the FETs' resistance, and this, in turn, increases heat. When running the 28-cell pack with an external BEC battery, the voltage stayed high enough to allow the FETs to pump "full bore."

IN-BUGGY TEST

Having completed the tests, it was time to have fun—and fun, of course, means driving a thundering R/C buggy! When installing an ESC, the first step is always to read the instructions.

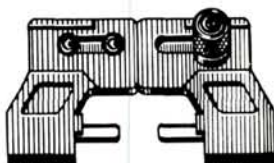
The good news about the Pullman's instruction sheet is that it doesn't take long to read; the bad news is that it won't be much help to first-time ESC users. There's a fairly good picture in which all the ESC's major components are identified, but there's no diagram showing it connected to a car's other components. I've installed dozens of speed controllers, so I found the instructions adequate, but I doubt that there's enough information for beginners. If you have trouble installing it, I hope an experienced modeler will be available to help you.

Having read the instruction sheet and installed the SCI Pullman in my Kyosho Sideways, it was time to match it to my transmitter. I centered the throttle trim on my Futaba Jr. radio, turned everything on and found that the green LED was flickering and the motor was running slowly. I adjusted the neutral trim pot until the motor stopped running and the LED went out. I then applied full brakes and the red LED came on. When I pulled the trigger for full throttle, the motor ran fast, but the LED was still flickering a little, indicating that the ESC wasn't fully on.

I re-read the instructions to see whether they dealt with this situation, and the information there assured me that, if I set neutral, the "full-on" would take care of itself. I didn't find this to be true, and I set out to find a transmitter setup that would give full throttle. I squeezed the trigger to open the throttle fully, and this time, I adjusted the transmitter's throttle trim to provide more forward. I stopped turning the trim when the green LED came on fully without flickering, and I then let the throttle return to neutral. The green LED was still burning, and the car was running slowly forward. I readjusted neutral

(Continued on page 152)

S & K RACING PRODUCTS



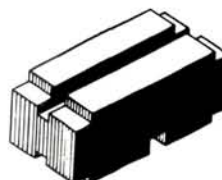
PRECISION HOOD ADJUSTER
#SKPHA10



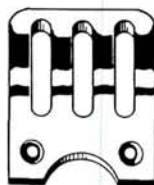
TEAM QUALITY 1400 SCR
#SCR 1400



BATTERY CLAW
#SKBJ12

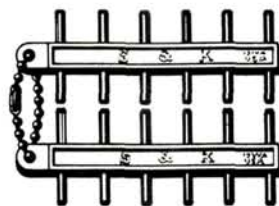


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GEAR IT UP

(Continued from page 32)

Use a larger spur gear (i.e., one with more teeth) with wheels and tires that have larger diameters (e.g., racing trucks). You'll be able to run smaller pinions and keep the final drive ratio as high as possible, which is necessary in truck racing.

When you choose spur and pinion gears, pick a gear ratio that meshes well on your car. The angle at which the pinion gear touches the spur gear is critical. For instance, with a large spur gear and a very small pinion gear, you might have trouble getting them to mesh properly (the mesh will be either too tight or too loose). Ideally, you should try to keep the spur and the pinion gear as close as possible in size. In the previous example, the 81-tooth spur/15-tooth pinion combination is preferable to the 87-tooth spur/16-tooth pinion combination because its gears are closer in size.

Another critical factor is the gear mesh itself. A gear mesh that's too tight will strain the motor; a gear mesh that's too loose can strip the gears. The best way to set the gear mesh is to thread a small strip

(Continued on page 136)

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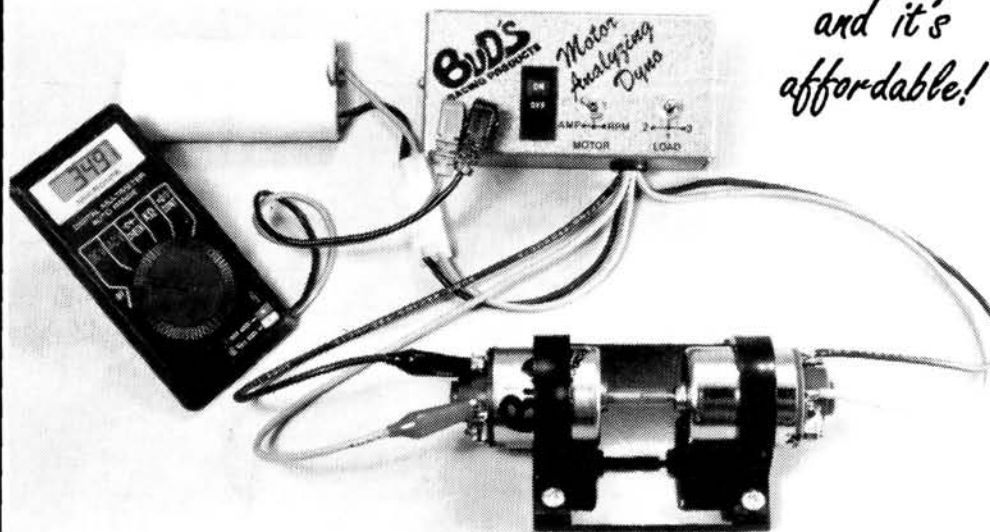
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AFTER ATTENDING Raceway Park's Summer Nationals in Englishtown, NJ, I had a great idea: I'd build my own dragster. I've been involved in the R/C hobby for quite a few years, and I enjoy building what no one else has built before. But electric?—no way! It *had* to be the real thing—a fuel-burning, nitro-powered dragster.

I decided to start from the rear and work my way forward. First, I needed a gearbox, and I found the perfect unit that was originally used on a Kyosho* 1/10-scale off-road car called the "Circuit 10 Wildcat." The durable transmission has its own engine mounts and starter cone. The four mounting holes in the transmission's front made it easy to attach the chassis.

The chassis is made of 3-foot lengths of 3/16-inch brass tube. I silver-soldered 6-32 Allen bolts into the ends of the tubes so that they could be secured to the rear gearbox. I made a radio-tray mount by sliding two 6-inch pieces of 3/16-inch brass square stock over the lower chassis rails, which I then soldered to the chassis. Then, I joined the upper rails to the lower rails in the front with a piece of

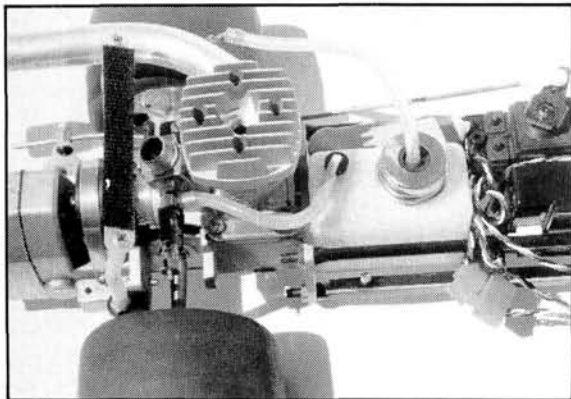
PHOTOS BY BILL O'BRIEN

Quarter-Mile

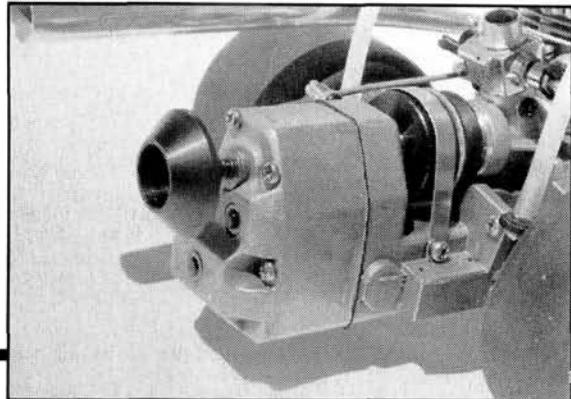
FIRE

by RICHARD ARALDI





Left: to power the dragster, an O.S. CZ-R engine is bolted directly to the rear end of Kyosho's Circuit 10 Wildcat gearbox. ■ Right: the starter cone on the rear of the gearbox makes it very easy to fire-up the dragster.



Quarter-Mile **FIRE**

U-shaped copper tube. To ensure that the chassis is straight and that the rails are of equal length, it's very important to measure from the rear axles to the front end. The front axle is made of a 3-inch length of 1/8-inch copper tube that I silver-soldered behind the U-shaped joint in the front. Again, measure carefully, or the axle won't be square with the rest of the chassis. For more support, I added three pieces of tube along the length of chassis.

The front end is made of Tamiya* car parts. I drilled Prather* 1/4-scale, midget racing plane wheels to fit into the Tamiya Falcon front axles, and I replaced the gearbox's rear axle with a longer one. To mount the Associated* 10L wheel hubs, successively larger pieces of brass tube were needed on the axles. Setscrews lock the hubs to the axles, and Sees* spoked aluminum rims with TMS* tires provide

the rear traction.

To power the dragster, the choice was quite simple. The drive system was designed to accept an O.S.* CZ-R .12-size engine, which dropped right in. I replaced the stock rod with an RPM* connecting rod. (A high-quality rod is essential when

chassis with Velcro® strips. To provide down-force for the rear end, I mounted Bud's* mini off-road wing on long wing wire. I have several old Futaba* FP-2F radios, and I wound up

enjoyed building it. I'm sure it will get your creative juices flowing. There's just one problem: I'm the only one who has one, so I have no one to race against. Come on, guys; it's so lonely out here all by myself. The smell of nitro is in the air!

**Here are the addresses of the companies mentioned in this article:*

Kyosho/Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61824.

MRC/Tamiya, 200 Carter Dr., Edison, NJ 08817.

Prather Products Inc., 1660 Ravenna Ave., Wilmington, CA 90744.

Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626.

Sees Precision Machine Works, 1414 W. 134 St., Unit 2, Gardena, CA 90249.

TMS Products, 1948-A Del Amo Blvd. Dept 7, Torrance, CA 90501.

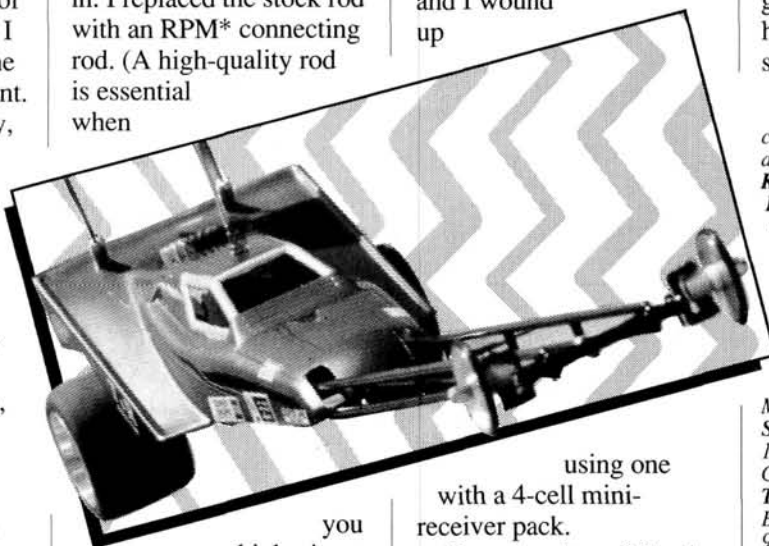
O.S., distributed by Great Planes Model Distributors, 1608 Interstate Dr., P.O. Box 4021, Champaign IL 61824.

RPM, 14978 Sierra Bonita Ln., Chino, CA 91710.

Parma International, 13927 Progress Pky., North Royalton, OH 44133.

Bud's Racing Products, 1575 Lowell St., Elyria, OH 44035.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718. ■

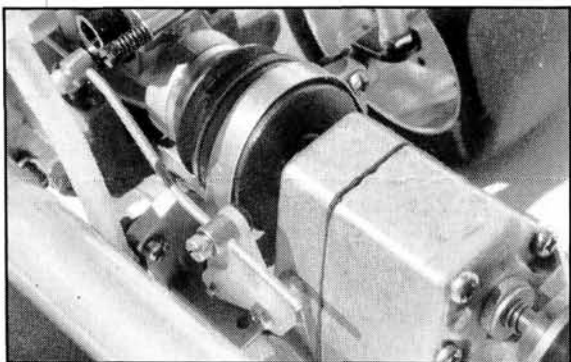


using one with a 4-cell mini-receiver pack.

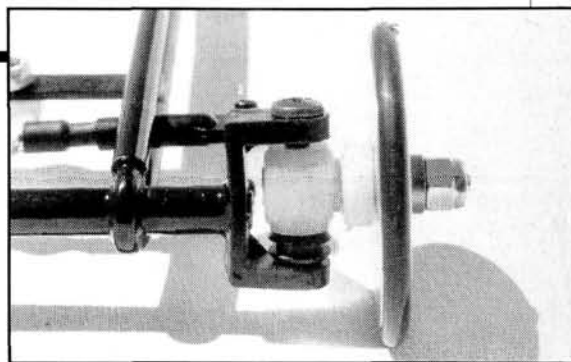
How does it run? Fast! I'm still experimenting with fuel and carb settings, so I think I can make it go even faster. It certainly isn't the fastest R/C dragster around, but it's the most unusual. I hope you enjoyed reading about this project as much as I

you use high-nitro fuel.) A brass strip, which is connected to the throttle linkage, wraps around the flywheel and is used to stop the dragster after a run.

I chose Parma's* Stinger off-road body, which I mounted to the



Left: stopping the dragster is no problem with Kyosho's Circuit 10 brake strap. Both the throttle and the brake are controlled by a single servo and linkage. ■ Right: the dragster's front end is mostly scratch-built. Notice the Tamiya steering blocks and the O-ring front wheels.



NITRO NEWS

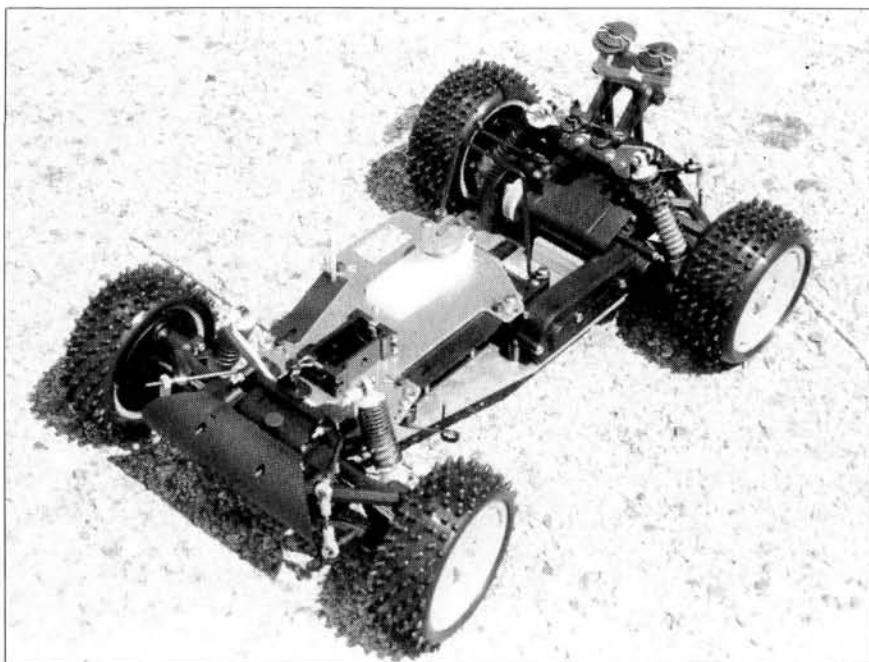
by JEFF BRONSTEIN

Latest gas goodies

WORLD-CLASS RACING wasn't the only thing worth checkin' out at this year's $1/8$ -scale World Championships in Austin, TX. Several major manufacturers were on hand to test their new equipment at the race. (Winning an international title does a lot for a manufacturer's reputation.) In addition to $1/8$ -scale equipment, there was also a variety of other interesting products. Between rounds, *Radio Control Car Action* aimed its cameras at some of the newest nitro-burnin' race gear anywhere.

WORLD-CLASS INTROS

The stock BMT/Blitz car that Lamberto Collari drove to win this year's IFMAR World Championship represents the highest level of $1/8$ -scale racing. Trick suspension springs are mounted under the A-arms, and shocks are mounted in front for better geometry and accessibility. One of the unique features is the color-coded, two-speed spur gear that helps eliminate teeth-counting. Although the Blitz three-speed isn't quite perfect, IFMAR has given the OK to three-speed transmissions at future world championships. The Blitz car has changed little since last year, possibly because of BMT's introduction of its new off-road cars. BMT's off-road, $1/8$ -scale 2WD and 4WD cars will challenge the popular Kyosho Turbo Burns, the



BMT's $1/8$ -scale off-road car is sure to be a threat to the Kyosho Burns, the Mugen Super Sport and the Pirate M1.

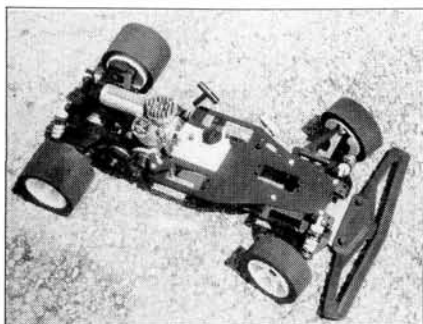
World Champion Mugen Super Sport and the Pirate M1 for dominance in the off-road circuit. Unlike the Kyosho car, with its front-to-back mounted engine, the new BMT will feature a side-to-side mount similar to most on-road cars. BMT also displayed an awesome $1/4$ -scale Formula 1 car, complete with an independent suspension, a cantilever shock setup, a gear diff, disk brakes and a Quadra engine.

Europeans take their racing very seriously, and this passion is reflected in their race technology. Even Ron Paris of Paris Racing had to get a look at the new $1/8$ -scale Formula 1 race car from Compagnucci of Italy. Its cantilever suspension is completely scale in form, right down to the shock placement. To improve aerodynamics and lower the car's center of gravity, the low-mounted, integrated 3.5cc engine is angled back. The well-planned three-speed transmission/rotor unit located near the middle of the car is most impressive. A center slipper

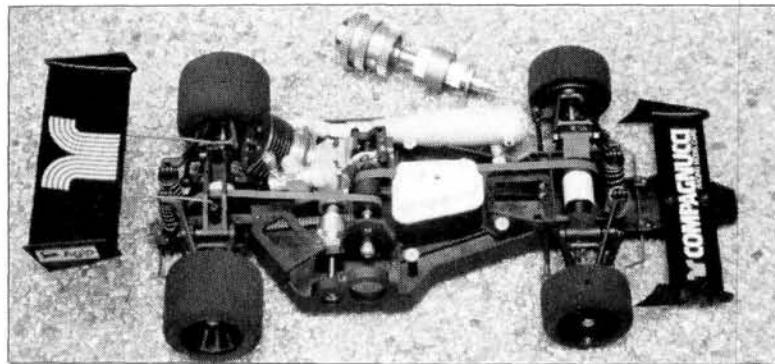
unit drives both diffs and provides four-wheel brakes (illegal in ROAR competition). Its polymer fiberglass tub-type chassis is light and strong. Compagnucci also claims that all this technology won't damage your wallet; its reported cost is less than \$300.

Akihisa "Hatch" Hashimoto of Team Delta* gave us a first look at his new prototype design, presently called the "Hatch-mobile." Delta continually amazes people by developing outstanding designs on a shoestring budget. This new design incorporates a pair of jackshafts to distribute the power, a new brake layout and older, stock, nylon P4 suspension arms that have been upgraded with three graphite ball-link units for added adjustability. The car fared well at the Worlds, but additional refinements on the front suspension are still necessary.

World champion Roddy Roem displayed yet another world-class design—his new Parsec Sigma. This is undoubtedly the meanest-looking car anywhere.



Serpent's new $1/10$ -scale gas car—the Impact 10—has a belt-drive system to power the rear wheels.



From Compagnucci of Italy comes a new 1/8-scale car with a realistic cantilever suspension.

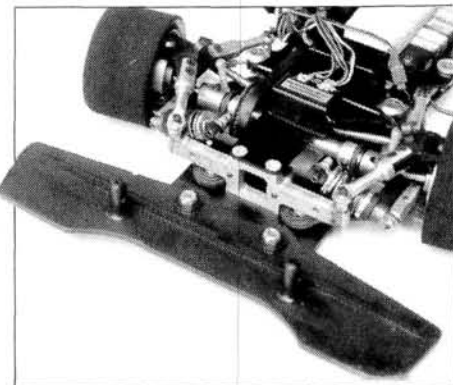
The front shocks and shock linkage lie flat and parallel between the front suspension arms. A slim carbon/graphite chassis sandwiches much of the radio gear and provides a Formula 1-type layout.

World-champion drivers are always on the lookout for more power, and engine manufacturers respond to their demands. Nova Rossi's new 2000 series engine has an all-new design for the Gold Head 3.5s and a new engine case for the Rex for better performance. Nova's Rex engine ran well for Lamberto Collari, and it has been very successful in the United States. Paris Racing's Rex modified engines have powered Team Associated to many national titles. The new seven-port modified engines are for experienced racers only. The Rex U.S. black-head engines are also available in three- and six-port versions, both stock or Paris modified, but don't call Ron to get one! He helps to preserve the sport by selling to authorized distributors only, so see your local hobby dealer. Nova's newest engine is called the "Top." The eight-port engine is reported to have serious performance characteristics, and already Steve O'Donnell of O'Donnell Racing may have struck a deal to modify it for even greater output. The contender for box-stock powerhouse has to be Picco's* Serpent Power P5, which can challenge most modifieds. Updated regularly, S-Power can be recognized by its distinctive purple head.

Michael Salven and Team Serpent experimented with several prototype hop-

ups for the Sprint TQ series. In addition to the new horizontal shock setup and the lowered, narrowed chassis, Salven's car features a new pressure-plate-type clutch, suspension-mounted body posts and a shorter wheelbase. The new clutch system uses a cone-shaped flywheel and a clutch bell with free-floating shoes. Serpent's dedication to performance keeps it on the cutting edge of technology. Most of the new parts are available in the new 6020 kit. (The clutch and body-mount system aren't included in the kit.)

Serpent's Impact 10 brings nitro to 1/10-scale racing. It's a combination of sophisticated 1/8-scale technology and basic 1/10-scale simplicity. The Impact 10 uses many of the same suspension and drive parts as its bigger brother, and it can be upgraded just as easily. A couple of quick rips on the built-in pull-starter (engine and starter are included), and you're off



Here's a close look at the front end of the "Hatchmobile." Talk about high-tech!

and running. A simple 2WD straight axle drives the Impact; no two speeds, no 4WD and no complicated overdrive ratios. Although somewhat underpowered with the stock .10 cubic-inch displacement (cid) engine, a .12 and .15cid are both likely in the near future.

Several Group C/GTP bodies saw World's action this year, but the downforce of the open-cockpit Can-Am body still hasn't been improved upon. International racing is slowly moving toward closed-cockpit cars, owing to most people's familiarity with the image. Although a proposal by EFRA to mandate closed-cockpit bodies at the World Championships failed, it may only be a matter of time. Parma's* new Chevy Intrepid GTP combines great scale looks with wind-tunnel-tested aerodynamics. The body's excellent downforce is due in part to its similarities to the two-time World Championship-winning Parma VDS Lola body. The body will be available in 1/8-, 1/10- and, shortly, in 1/12-scale versions. Intrepid's EDS and ICI sponsor decal sheets will also be available from Parma.

If necessity is the mother of invention, racing is the godfather of derangement. Racers will try just about anything within the boundaries of the racing rules to find a mechanical advantage. Some of the things we saw (or heard about) ran the gamut from clever to wacky. Disk brakes are common on 1/8-scale cars, but what about anti-lock brake systems? Or how about on board computer monitoring gear? As time goes on, R/C racing continues to close the gap between hobby and all-out professional sport.

**Here are the addresses of the companies mentioned in this article:*

Delta Mfg., 27 Racecar Ct., Lorimar, IA 50149.
Picco; distributed by Tidewater Engineering, 2406 W. Madison Ave., P.O. Box 1135, Bastrop, LA 71220.

Parma Int'l., 13927 Progress Pkwy., North Royalton, OH 44133. ■



by BOB GAGNE

THERE ARE THOSE who love R/C racing trucks, and there are those who argue that the only true R/C trucks are monster trucks such as the Blackfoot and the Big Bear. Those of the monster-truck persuasion contend that the new racing trucks are nothing more than buggies with big tires. My reaction to that is, "Who cares?" I want to go fast when I put my truck on the track. I'm not all that interested in the history and development of the monster truck; I'm interested in getting to the finish line before everyone else! I also point out that almost all R/C trucks started as buggies. The revered Blackfoot was originally a Frog, which the good Princess Tamiya kissed and turned into a monster truck. But I digress!

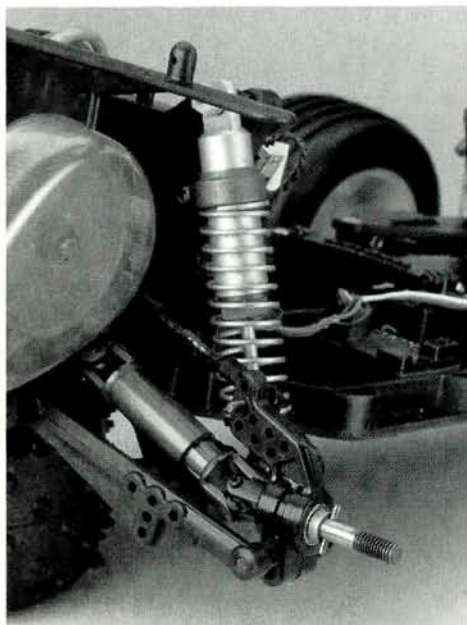
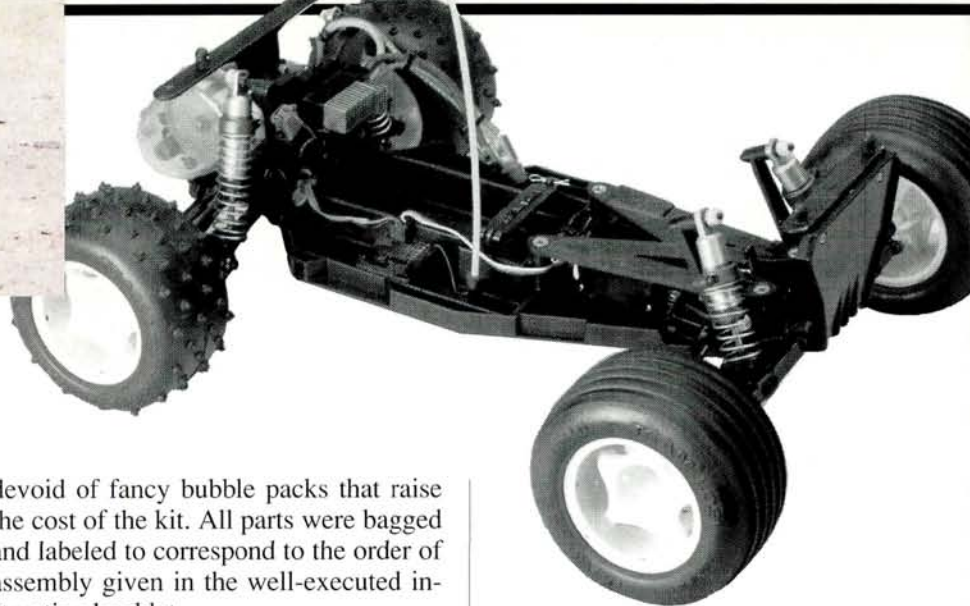
With the introduction of kits like the Traxxas Blue Eagle, the Schumacher Shotgun, the Ultima Outlaw and the Losi JR-XT, the days of the racing Blackfoot came to an end—much like the Frog when the RC10 was introduced. The new breed of all-out racing trucks are now into their second generation. Little of the monster-truck detailing is left, but they're much faster. Such is the case with the latest offering from Team Losi, the Junior T.

T E A M L O S I
junior

**low-
buck
truck**



PHOTOS BY BOB GAGNE & STEVE POND



H-arms are used on the Junior T because they're easier to install than the five-link system. Team Losi supplies their new beveled spur gear to reduce rotating mass even more and improve acceleration.

performance beauty by calling it an entry-level racer and by removing some of the high-performance parts that are standard equipment on the JR-XT. For example, the Junior T has plain threaded rods for the tie rods and upper control arms; the JR-XT has turnbuckles. Nylon bushings are at all four corners of the Junior T, but the JR-XT has ball bearings. JR-X2 shocks of standard length are used on the Junior T, but the JR-XT has extra-long shocks. On the other hand, the Junior T weighs in at a slim 3 pounds, 15 ounces, but the JR-XT is a hefty 4 pounds, 4 ounces. These changes can't hide the fact that this truck is a real competitor.

THE KIT

Like all Team Losi cars and trucks, the kit came in a no-nonsense box that was

devoid of fancy bubble packs that raise the cost of the kit. All parts were bagged and labeled to correspond to the order of assembly given in the well-executed instruction booklet.

Some of the things you'd expect to find in an entry-level kit are conspicuously absent from the Junior T. There's neither a 540-type motor nor a three-step mechanical speed controller. This is to Team Losi's credit, as the 540-type motor is unsuitable for most competition, and mechanical speed controllers often are replaced after the first few races. By eliminating these parts, Team Losi has kept down the price of the kit.

Team Losi doesn't include the turnbuckles usually used for tie rods and upper control links. Once you've used turnbuckles, you get spoiled by their ease of adjustment. On the other hand, it's really a minor inconvenience to pop the ball ends and turn the threaded rods in or out. Threaded rods still beat non-adjustable links.

Missing also are the axle bearings, both front and rear. Team Losi included a full set of high-quality ball bearings for the transmission, but it cut costs by including nylon bushings for the axles. The nylon is much more durable than the white plastic units with which everyone is familiar. Losi's bushings are of molded, lubrication-impregnated nylon that rivals the durability of bronze bushings.

The JR-XT's graphite chassis and shock towers have been replaced by a molded tub that's made of high-tech matrix fiber/resin composite, which is stiff (not brittle), very light and relatively inexpensive. It's similar to Kelron, which is used on the latest Kyosho cars and trucks. This may be the chassis material of the future. (In fact, Team Losi drivers

SPECIFICATIONS

Type 2WD off-road racing truck
Scale 1/10
Sug. Retail Price \$199.95

DIMENSIONS:

Overall Length 15.9 inches
Width 12 inches
Wheelbase 11.25 inches
Front Track 9.8 inches
Rear Track 9.6 inches

WEIGHT:

Gross (with battery) .63 ounces

BODY:

Type Ford Bronco off-road
Material Polycarbonate



T E A M L O S I
JUNIOR T

CHASSIS:

Type Molded tub
Material Matrix fiber/resin composite

have traded in their flat graphite chassis for the new matrix fiber/resin tub.) The shock towers are made of the same material.

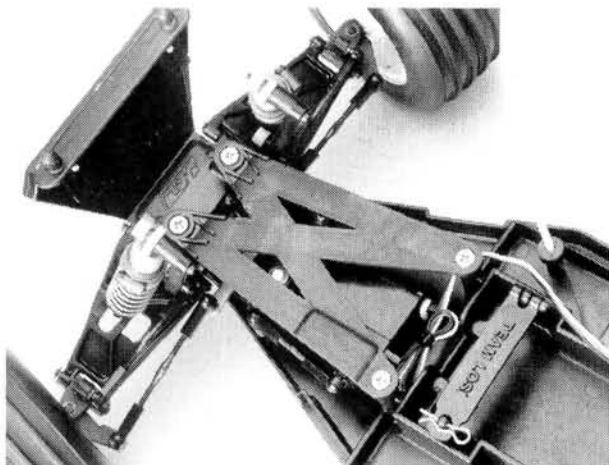
The shock absorbers are the same high-quality units as those that are found on the JR-X2 and Junior Two. The front shocks are considerably shorter than those supplied with the JR-XT kit. Short front shocks work well for the buggy kits and, except on the roughest of tracks, should work well for the Junior T.

Although no major change has been made to the transmission, the light beveled spur gear contributes to acceleration by reducing weight and friction. The light one-piece nylon wheels also contribute to the truck's faster acceleration and the

kit's lower price. Another low-cost, high-performance feature is the H-arm rear suspension system. This system (introduced on the JRX-Pro) is easier for beginners to assemble than the original five-link setup, and it eliminates the need for 24 small parts. My only problem is that the H-arm rear suspension makes the truck's handling much more aggressive and harder to control than the very forgiving five-link rear suspension system. (The chassis does have provision for the installation of the five-link system.)

ASSEMBLY

As I had expected, this kit was very easy to assemble—easier than many Tamiya kits, which are known for their ease of assembly and their excellent instructions. The Losi instructions are very well-organized. They include line drawings of each step with written explanations to keep you out of trouble. You could build this kit from the drawings alone, but you should read all the text to be sure that you're putting everything where it belongs and in the proper order. A few words of warning: not all the scaled silhouettes of screws and other small hardware are accurate. To be sure, measure the parts and read the size



Although the matrix fiber/resin molded chassis is very rigid, the front end is further stiffened with a brace.

DRIVE TRAIN:

Primary Pinion/spur
Transmission Gear
Differential Ball
Bearings/Bushings Ball bearings

SUSPENSION:

Type (f/r) H-arm/control arm
Damping (f/r) Aluminum, oil-filled,
coil-over shocks

WHEELS:

Type (f/r) One-piece plastic
Dimensions (DxW) (f/r) ..2.2x1.8 inches

TIRES:

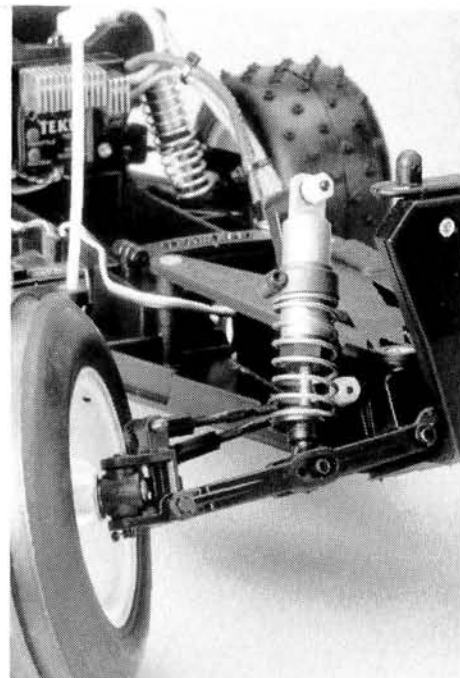
Front Ribbed
Rear Spike

ELECTRICS:

Motor, Speed Controller, Battery Not
included

Options as Tested: Tekin receiver and 411P ESC; Twister 16-turn double-wind motor; 6-cell Sanyo 1400 SCR battery pack.

Comments: the Losi Junior T is more than just an entry-level racing truck; it handles well and will accelerate quickly, so it's a contender for the A-Main at any track. With the addition of wheel ball bearings, this truck will be ready for any competition. The molded chassis is very stiff and looks practically indestructible.



The only change to the front suspension is the use of composite shock towers that are reminiscent of those used for years by Tamiya.

needed in the text.

As a bonus, the Junior T kits are now sold with a videotape instruction manual to guide you through the assembly. These instructions are the first of their kind, and they offer something that printed instructions simply can't match. The high-quality video features Gil Losi Jr., Gary Kyes, Kyle Reed, Jack Johnson, Jay Halsey and Ron Rosetti offering instructions and tips on every aspect of the kit's assembly. Other notable racers cover radio and electronics installation.

The instructions divide the construction into seven assemblies (labeled A through G). The parts bags are marked with the letter that corresponds to that assembly step in the instructions. It's the most logical way to assemble a kit, because you only work with one open bag at a time. This minimizes the possibility of losing parts.

The Junior T's transmission is the key to its high performance. In my opinion, it's the best all-around tranny in the industry. It's very easy to assemble, but there are some things with which you must take care.

- Make sure that all bearings seat perfectly, or they'll bind and ruin performance.
- Use only a small amount of diff lube in the holes of the center differential gear
- Be sure to install all "E" clips properly on the top gearbox shaft.

The only problem with assembling the Losi drive train is that many of the holes in the metal parts have burrs on them that

(Continued on page 170)

Serpent Tenforce

by ALEX STROUTHOPOULOS

WHEN PEOPLE DO things in the same way for a very long time, sometimes they lose their creativity; they can only think of ideas within certain parameters. When this happens in the R/C car industry, car designs become derivative—all of them similar in shape and form. Such is the world of 1/10-scale, on-road cars. At a glance, all the current cars seem to be the same, i.e., pan-car designs with very limited front suspensions and straight-axle rear ends. These cars perform better than they did a few years ago, but the same concepts only work well for just so long.

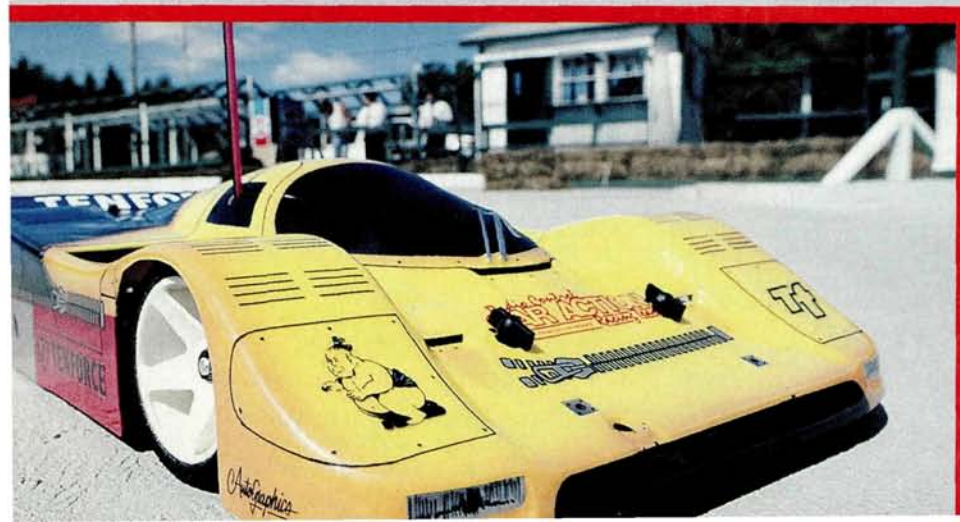
Every so often, someone steps back, looks at a situation in a new way and develops a totally new approach. The people at Serpent* took just such a step back, and they started from scratch. The result is an on-road car unlike any other—the Tenforce.

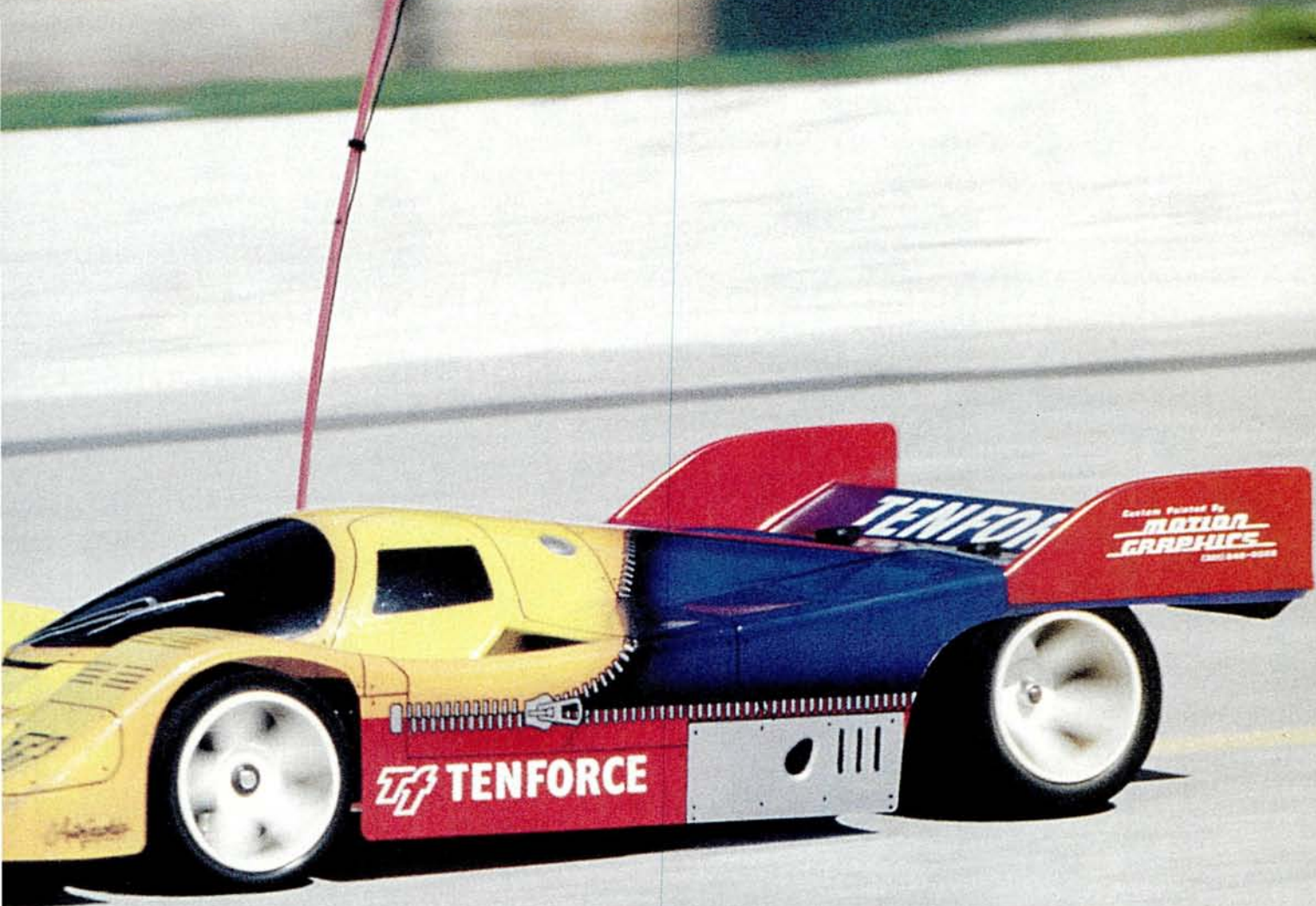
The Tenforce is best described as a downsized, simplified 2WD 1/8-scale

gas car that's powered by a motor and a set of sub-Cs instead of a nitro-burning 2-stroke and a full tank of fuel. This design is no surprise, since Serpent's Sprint 6000 is one of the premier 1/8-scale gas cars on the market. The 1/10-scale Tenforce is a belt-driven electric road car that has independent suspension up front and in the

rear. Its suspension isn't radically different from what's found on today's high-tech off-landers, but the fact that it's *independent* makes this car noteworthy! It uses four, small, oil-filled coil-over, shocks; front and rear anti-roll bars; and adjustable turnbuckles on all four corners.

A car can have the most radical suspension in the world, but to work properly, its suspension must be connected to a very rigid chassis so that the suspension—not the chassis—does the damping. The Tenforce's metal chassis is





similar to those used on the Corally cars. It's very rigid, but very heavy—more than 7 ounces! This weight is in addition to the extra weight of the four shocks and the suspension, as well as the battery and motor! Serpent also makes a narrower chassis that's about 2½ ounces lighter, yet almost as rigid.

There isn't much else to the Tenforce, which is good because, as Murphy's Racing Law states, "Anything that can break, will—during the Main!"

ASSEMBLY

First, I examined the instruction manual, because it's impossible to assemble a car correctly without reading the instructions carefully. The manual was small, and it included a few diagrams, step-by-step instructions, an exploded-view diagram and a sheet that listed corrections to

some of the instructions. The instructions are translated to English from Dutch, and some of the grammar and technical terms are incorrect. The exploded-view diagram is the most important part of the manual; without it, I'd have been lost on several occasions. After reading the manual, I concluded

Radical reptile

PHOTOS BY JOHN HUBER

Type On-Road
Scale 1/10
Price \$399.95

DIMENSIONS:

Overall Length 18.250 inches
Width 9.5 inches
Wheelbase 10.75 inches
Front Track 7.875 inches
Rear Track 7.625 inches

WEIGHT:

Gross (with battery) 3 pounds,
2.33 ounces

BODY:

Type Porsche 962
Material Polycarbonate

CHASSIS:

Type Pan
Material Alloy

DRIVE TRAIN:

Primary Belt
Transmission None
Differential Ball
Bearings/Bushings Ball
Bearings

SUSPENSION:

Type (f/r) Single A-arm with upper
control link
Damping (f/r) .. Oil-filled, coil over
shocks

WHEELS:

Front: Type One-piece nylon
Dimensions (DxW) ... 2x1.25
inches
Rear: Type One-piece nylon
Dimensions (DxW) 2x2
inches

TIRES:

Front/Rear Foam

ELECTRICS:

Batteries 6-cell stick or saddle
pack (not included)
Motor, Speed Controller Not
included

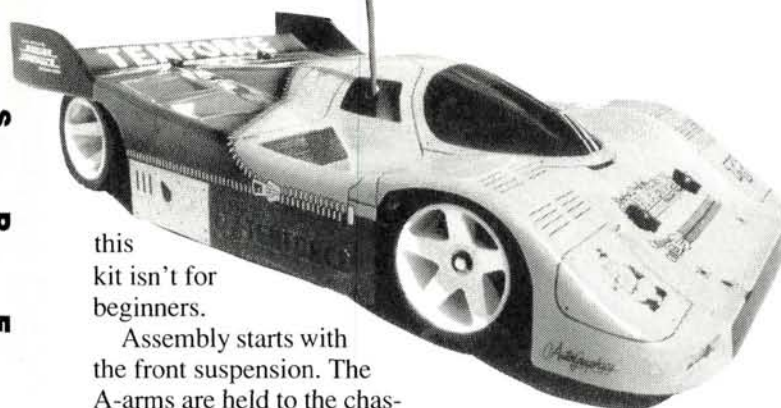
OPTIONS AS TESTED:

KO Propo EX-5 radio and KR-288
receiver; Futaba S132H servo;
Tekin 600 ESC; Team Losi JR's
Choice motor; Sanyo 6-cell SCE
pack; Andy's Porsche 962 body.

COMMENTS:

Using independent suspension in
an on-road car is great idea, and
the Serpent Tenforce design works
well. It only has two problems: it's
heavy, and its diff lacks refinement.
When it's set up properly, though,
Tenforce handles very well.

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this
kit isn't for
beginners.

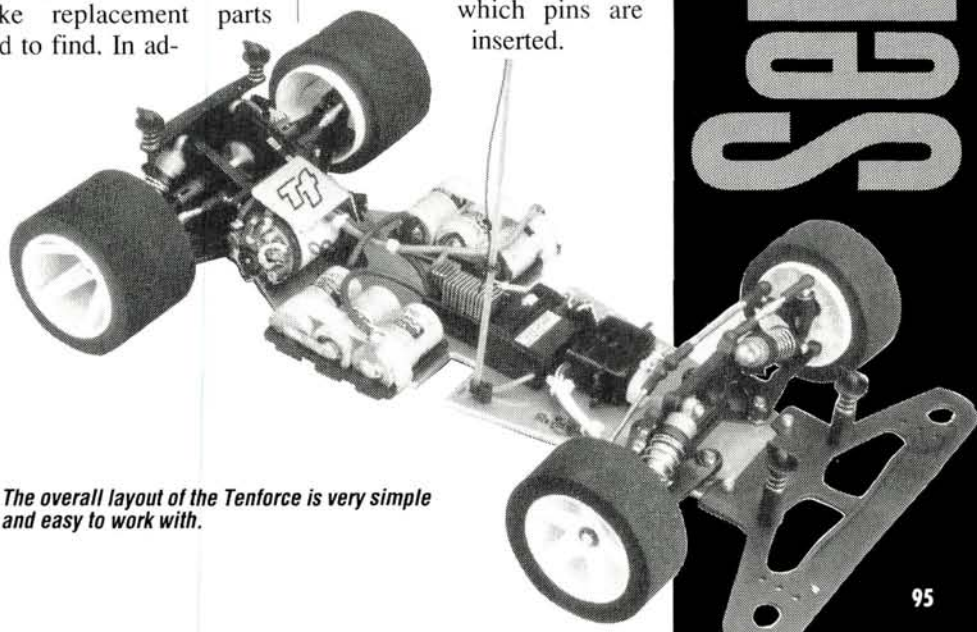
Assembly starts with
the front suspension. The
A-arms are held to the chas-
sis by pivot balls, which are
inserted into the arms at the
factory. I simply bolted the
balls and the arms to the
chassis, and attached an up-
right to the A-arm with a
hinge pin. The hinge pin is
held in place by a grub
screw (instead of E-clips)
that's inserted into the bot-
tom of the upright and then
tightened against the hinge
pin. The assembly seemed
normal until I got out my
Allen keys to tighten the
grub screw; it required the
use of a small flat-head
screwdriver instead! None
of the screwdrivers I had
were small enough, so I
rummaged through my
house until I found one
that's used to fix eyeglasses.
I tightened the grub screw
and assembled the rest of the
front end without a hitch.

The differential was next
on the list. Of all the assem-
blies in this kit, I must say
that the differential is the
most lacking. It uses odd-
size rings and balls, and this
make replacement parts
hard to find. In ad-

dition, you have to pin the
rings to the two hubs; other-
wise, they slip on the hubs. I
used a small drop of CA to
solve this problem. I also dis-
covered a problem with the
bushing that rides in the cen-
ter of the diff pulley. Its in-
side diameter was slightly
smaller than the hub that goes
through it, so the diff halves
couldn't be joined. To solve
this, I filed the bushing with
a needle file.

The last part of the diff
that's assembled is the thrust
bearing. It's like most con-
ventional thrust bearings, i.e.,
it has two washers with a set
of small balls that ride be-
tween them. I simply inserted
the long screw into the bear-
ing and through the hub and
the diff, and then I tightened
it against the other hub. This
assembly seems to work well.

After I had installed the
diff in the chassis, I as-
sembled the dogbones. They
consist of small nylon rods
with holes in their ends into
which pins are
inserted.

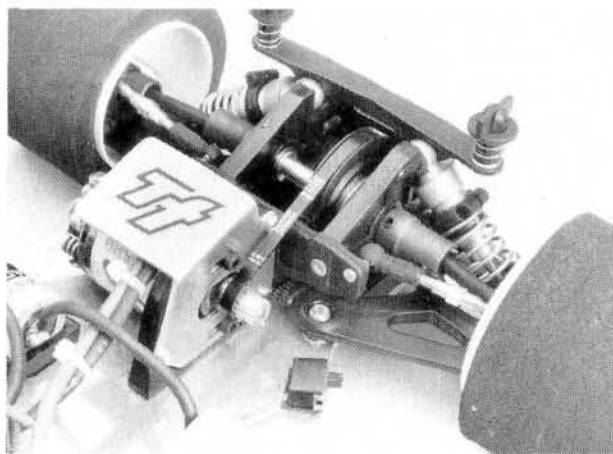


*The overall layout of the Tenforce is very simple
and easy to work with.*

TOTALLY
**DIFFERENT FROM
ANY CURRENT
ON-ROAD ELEC-
TRIC CAR, THE
TENFORCE'S
DESIGN IS MORE
LIKE THAT OF THE
SERPENT
SPRINT 6000**

Serpent Tenforce

Serpent Tenforce



Top: The belt drive is efficient, and it enables the Tenforce to run silently at full speed! Note the large cooling plate that folds over the motor.

Above: The batteries are held in trays that are bolted to the chassis, and you can reposition the trays to suit the car's handling needs.

GET GEARED, GET READY...

Next, I installed the radio gear. I wanted to use mini components to keep the weight down, but most of my *really* lightweight stuff was out of commission. I use a Futaba* S132H miniservo for steering, a KO Propo* KR-288 receiver and a Tekin* 600 speed controller, which may not be state-of-the-art, but it's incredibly small and light. For motivation, I dropped in a Team Losi* JR's Choice 17-turn, double-wind motor and a 6-cell Sanyo* SCE battery pack. After installing the supplied pulley and setting the belt tension, the car was almost ready to run. All I had to do was mount the body.

Since this is an on-road race car, I chose an Andy's Porsche 962 body. I sent it to Richard Muise at Motion Graphics.* He laid down some of the hottest lacquer he had, and designed the killer "zipper" paint scheme. Mounting the body was easy. The Tenforce uses a "pinless" mounting system that protects the body and holds it in place securely, even during hard crashes.

...GO!

I made the first Tenforce test runs at a local go-cart track. This fast, freshly paved track was the perfect place to test the Tenforce's ability. To set the trims

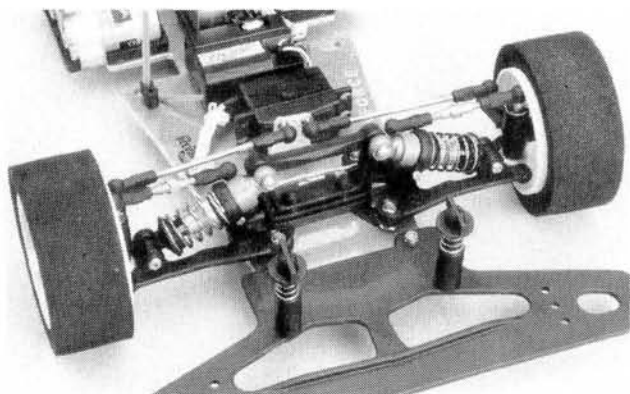
The pins are glued to the nylon with a drop of CA. This seemed rather strange because dogbones are subjected to a lot of stress, and I didn't think that the nylon would hold up very well, but only time would tell.

With the finished car sitting in front of me, two words came to mind: "wow" and "overweight." The Tenforce was one of the coolest on-road cars I had ever seen, and it looked as if it could tear up the track. The car's only problem seemed to be its weight, and aside from using the lighter chassis mentioned earlier, there wasn't much I could do to reduce it.

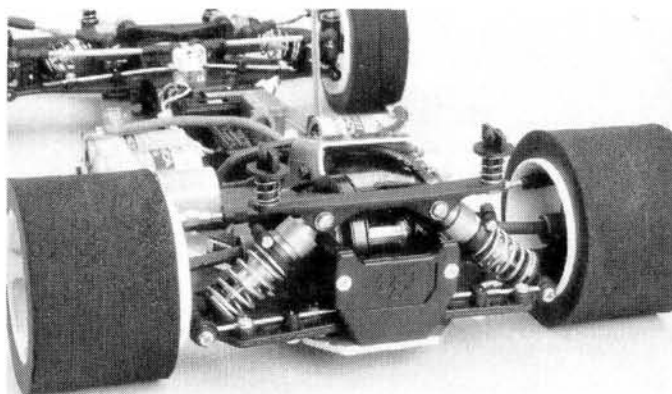
properly, I made a slow lap, and then I opened the throttle. The car took off like a silent rocket! The belt drive and the JR's Choice made the car lethal down the straights, and it provided more than enough power coming out of turns.

After only a few laps, the car began to slow down. I pulled it into the pits, and I discovered that the diff was loose. I tightened it up, and tested the car again, but the problem recurred a few laps later. I removed the diff to see if I could discover why this was happening. I stared at it for a few minutes, and then it hit me: the adjustment screw was threaded into metal,

(Continued on page 198)



The front suspension is probably the Tenforce's most unusual feature. It uses A-arms with upper control links, oil-filled shocks and a roll bar to keep both front tires on the track.

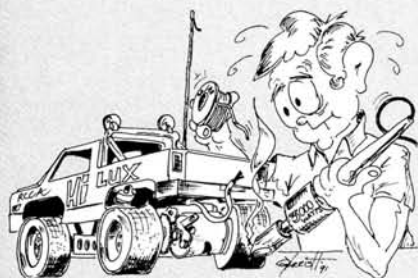


The Tenforce's rear suspension is similar to those used on 1/8-scale gas cars, but its components are slightly smaller.

TROUBLESHOOTING

by STEVE POND

Illustrations by GERRY YARRISH



TURNING UP THE HEAT

I use a Speedworks Buggy Master motor and a Futaba MC112B ESC with my Toyota Hi-Lux. It ran well for about a month; then, one day, it stopped running, but its steering still functioned. I discovered that a motor wire had become disconnected. I soldered it back on and drove the truck again, but the same thing happened. I tried my friend's Twister and Associated competition stock motors but the same thing happened with them. I checked the motors' resistors, and I also re-adjusted my ESC, but nothing solved the problem. My radio is an old 2-stick Futaba FP-T2GS. Any suggestions?

**Mike Craig
Quincy, CA**

Two things can cause the motor leads to become disconnected from the tabs. First, a poorly maintained, worn-out motor can become extremely hot because the current doesn't flow through it as well as it should, and this heat buildup can actually cause the motor leads to come unsoldered. Second, a cold or poorly soldered joint can easily pop off the tab if it's jarred. To determine if either of these conditions are contributing to your problem, run your truck and check its motor's temperature. If it's cold or just slightly warm, you might have to improve the solder joints. If it's very hot, it's either in poor shape, or its gearing is too high.

DOES IT GEAR UP?

My Lazer ZX has a Novak T-1 speed controller, a Speedworks 427 motor and a 7-cell SCE battery. I drive it on a dirt field that's half smooth and half covered with bumps and craters.

I went to a hobby shop to buy a Trinity King Kong motor, but the dealer wasn't sure whether my ESC could handle it. Although he assured me that the ESC would shut down if it got too hot, I don't want my car to stop unexpectedly. Buying a better ESC would mean spending about \$130 more than I had expected. The best solution would be to gear down, but the stock spur gear doesn't leave much room inside the gear cover. I need to use a bigger spur gear because my 16-tooth pinion doesn't reach the stock spur gear. I'd like to use at least a 14-turn double motor.

The instructions for the Gold shocks say to fill them with oil until you can see it above the edge of the shock. When I screw the cap on, the rubber thing on the inside of it pushes the oil out. What am I doing wrong?

I'm confused about 5-cell receiver packs. Do they recharge while they're hooked up to the receiver, or do I need a charger for them? The receiver often loses power while I'm driving the car. Would a stutter stopper work? I've tried using four AA batteries, but they interfere with the body.

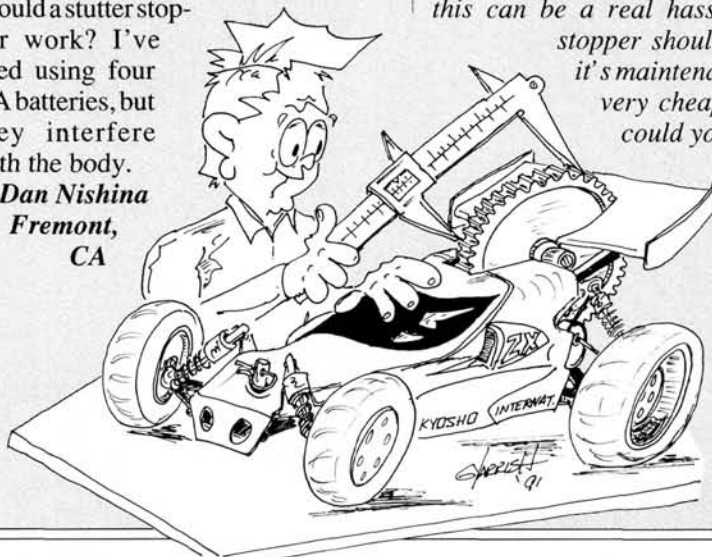
**Dan Nishina
Fremont,
CA**

The Novak T-1 can handle the Trinity King Kong 13-turn, double-wind motor, but you have to install it where there's plenty of air flow, and heat sinks are a must. Also, be sure to let the car cool down between runs.

As for the gearing, a 16-tooth pinion gear yields a 12.16:1 final drive ratio, which is a very good starting point for the King Kong. I've seen people use pinions with as few as 15 teeth on the Lazer (with stock spur gears). Although such gears require motor-mounting holes that are aligned properly to fit, trust me; they will fit.

You're not doing anything wrong with the shocks; excess oil is supposed to seep out during assembly. Just be sure to screw the shock caps on slowly. Kyosho Gold shocks operate smoothly as long as there aren't any air bubbles in the oil.

Five-cell receiver packs aren't charged through the receiver. These packs are similar to the Ni-Cd cells used to power the car, but they're smaller. Because of their size, they need a lower charge rate. On a linear charger, i.e., the Tekin BC100L, from .5 amp to 1 amp would be the max for a fast charge. Receiver batteries must be recharged after one or two runs, and this can be a real hassle. A stutter stopper should work well; it's maintenance-free and very cheap—what else could you ask for?



If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897.

PLUGGING AWAY

I own an RC10 and an Aristo-Craft speed controller. I want to buy a Novak electronic speed controller, but I need to know if Novak makes a plug that will fit an Aristo-Craft receiver.

If they don't, is there a way to solder another type of plug onto a Novak ESC?

Jeff Trimble
Wayne, MI

Novak doesn't offer a plug that's compatible with Aristo-Craft receivers, but there's a simple solution



to your problem. SCI Corp. of America (P.O. Box 13099, Sarasota, FL 34278) offers a Multi-Connector pack that includes connectors for most popular brands of controllers, including Aristo-Craft and Novak. If you follow the instructions carefully, changing the plug takes only two minutes, and you'll be able to use the Novak controller with your radio. Be very careful that the controller's wires are arranged in the proper order, though.

TOO MUCH "YANK" ON THE CRANK!

I've owned a Kyosho gas ZR-1 for about six months, and I really enjoy racing and maintaining it. The only exception to this is that I constantly have to repair and replace the recoil spring assembly and the one-way bearing in the O.S. CZ-R engine. The spring inside the recoil unit breaks, and to repair it, I shorten it and rewind it. I usually do this once or twice before I replace it. The one-way bearing wears on the side that's attached to the connecting rod and the crankshaft. The "experts" at my hobby shop can't offer an explanation—only replacement parts. Thanks for any assistance you can give.

Ron Friedman
Brooklyn, NY



The CZ-R's starter isn't designed to be pulled with the same gusto that's used to start a lawn mower. When you pull it too hard, the recoil spring breaks. Shortening the spring and rewinding it is a good temporary solution, but the shorter it is, the more likely it is to break. The next time you install a new spring, start the engine with quick, short pulls on the starter—this method will greatly reduce the chance that the spring will break.

The problem with the one-way bearing can be attributed to poor engine maintenance. Dirt and debris accelerate the wear of this bearing and other internal engine components. Also, to prevent fuel residue from gumming up the one-way bearing, run the engine until it's completely dry of fuel. While the engine idles, pinch the fuel line until the engine stalls. Crank the engine a few times to get rid of any fuel that remains in the crankcase, and put a few drops of after-run oil, e.g., Marvel Mystery Oil, in the carburetor. To coat the inside of the engine with oil, crank it a few more times.

COMING NEXT MONTH!

READER'S RIDE OF THE YEAR!

FEATURES

**IFMAR 1/8-Scale Worlds
Project Turbo Burns
Catalogue Collection**



TRACK REPORTS

**Kyosho XJ-220
Schmacher Nitro 10
TRC Lynx II Elite SS
McAllister Fly'n "M"**

COLUMNS

**Nitro News
Scoping Out
Troubleshooting**

SUPPORTIVE SUSPENSION?

I was very satisfied with my RC10 Graphite until recently. I cleaned the shocks and put new oil in them, and now they can't support the car (with the battery). What should I do? Can I stretch the springs? Should I buy a heavier shock oil? Can I buy springs at a local hardware store, or do I have to buy them at my hobby shop? The kit came with two sets of springs; should I double them? Please help!

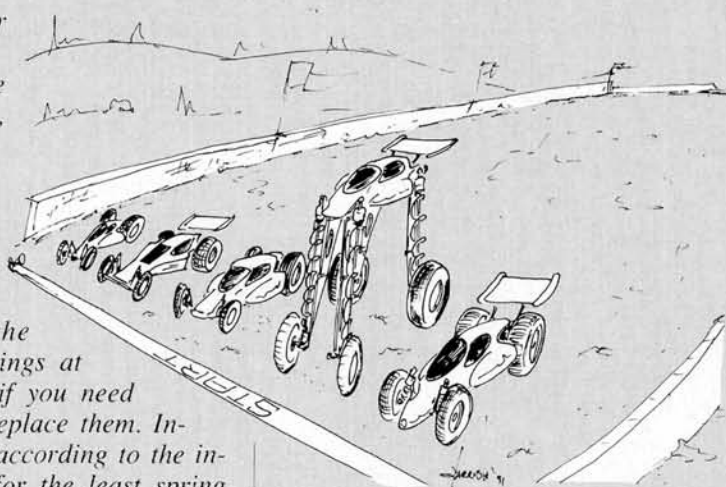
Adam Brown
Meadville, PA

None of these. If your car weighs less than 4 pounds, the stock springs and shocks should be perfect for it. I don't know what you consider adequate spring tension, so I'll explain briefly how the car should be setup.

Many racers think that the suspension should be completely extended when the car is at rest, so they push the shocks' spring collars down as far as they can go without falling off. Actually, this is the worst thing you can do to the suspension; the car will bounce like

a pogo stick over every bump!

To set up the shocks properly, start by using 30WT oil in all of them. Most (though, not all) kits come with gold and silver springs. Use the softer silver springs at first, and then, if you need stiffer springs, replace them. Install the shocks according to the instructions, and for the least spring tension, slide the spring collars to the tops of them. Gradually slide the rear shocks' spring collars down until the rear suspension arms are parallel. To determine where the suspension comes to rest, raise the car's rear about 6 inches and drop it every time you move the collars. When you've set the rear end properly, adjust the front end. Again, move the spring collars down gradually. Make sure that the front end



of the chassis sits only slightly higher than the rear.

With these adjustments, the shocks and the suspension aren't completely extended. This setup allows the suspension to travel up and down from the neutral position. It might not look as cool, but check out your friends' faces when you go blowin' by them fast enough to suck the bodies off their cars!

I run my JR-XT with a Trinity 350 Speedworks motor, a Novak T-1 controller, a 1400 SCR battery and an Airtronics XL2P radio. When its battery is low, I can't control it. *It has a mind of its own!* A man who works in a hobby shop put my Novak together. I've talked to others who work in a hobby shop, and they said they've had the same problem with their T-1s and T-4s. I thought that ESCs couldn't go haywire when their batteries were low. Please help!

David Sisangkhamh
Ontario, CA

Electronic speed controllers are designed primarily for competition. They have a BEC (battery-eliminator circuit) that eliminates the need for a separate battery pack to power the receiver. The down side to this is that the main battery pack powers the receiver. When this pack's voltage drops, so does the amount of power going to the receiver;

OUT OF CONTROL!

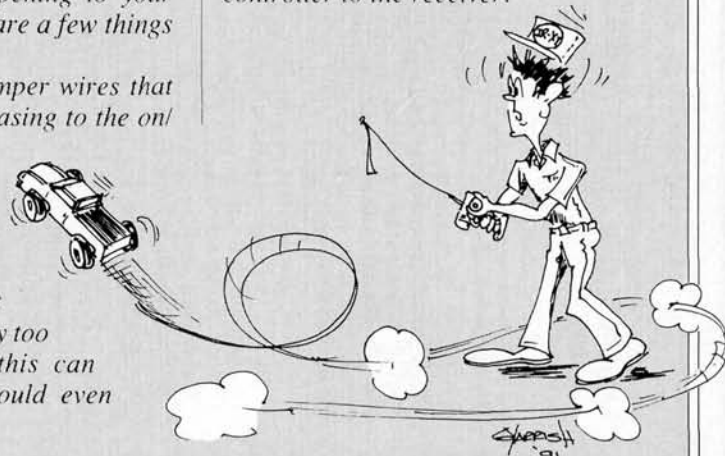
when it drops below a certain point, you lose control of the car. (At this point, most racers pull their vehicles off the track.)

How long a vehicle can run before you lose control depends on the receiver/controller combination that you use. (Although all of them will eventually cause a loss of control, some combinations are better than others.) If you think it's happening to your truck too soon, there are a few things you can try:

- Connect the two jumper wires that exit the controller's casing to the on/off switch wires. This will increase the voltage that's supplied to the receiver. Be forewarned, however, that this setup might supply too much voltage, and this can cause glitching or could even damage the receiver.

- Use a stutter-stopper capacitor. It stores electricity that will be used by the receiver if power from the speed controller is momentarily lost. It only works for about five seconds though, so for longer power losses, you'll have to try something else.

- Use a receiver pack. To use one with an ESC, you have to remove the red lead from the plug that runs from the controller to the receiver.



Radio Control **Racer**



■ **ANDY'S R/C
ROAR ON-ROAD
NATS**

■ **Build a
DIFFMETER**

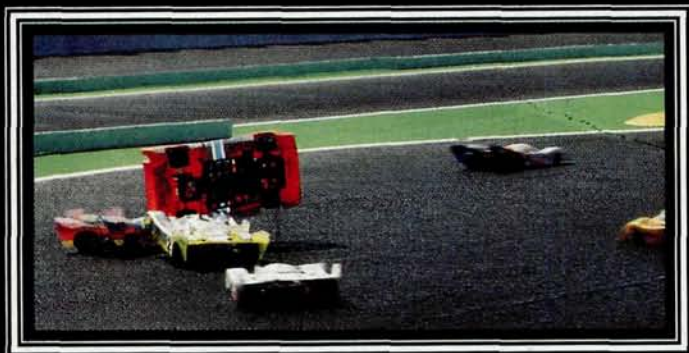
■ **Post-Race
Maintenance**

■ **Hot Tracks**

■ **Speed Shop**

■ **Track
Directory**

Radio Control **Racer**



Welcome to the second edition of *Car Action* magazine's *Radio Control Racer*. This special section was designed to give all you race-heads out there an in-depth look at the latest developments in R/C racing. In these pages, you'll find information on the latest technological breakthroughs as well as the scoop on who's who in R/C racing.

This month, we're proud to feature comprehensive coverage of the '91 ROAR On-Road Nationals by none other than *Car Action*'s Mike "Bruce" Lee. Also on the agenda are "how-to" articles—"Post-Race Maintenance" and "Building a Diffmeter"—that will help you leave the competition in the dust.

In addition to these great articles, we've also included our perpetually updated Track Directory—the most extensive one in the world!

To find out about the hottest new products from the industry's leading manufacturers, look no farther than "Speed Shop"; you'll see it there first!

If you want all the race-winning info you'll ever need, with up-to-the-minute product news, then read on; the *Radio Control Racer* section is just what you've been waiting for.



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ROAR On-Road Nats*

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126 *Track Directory*



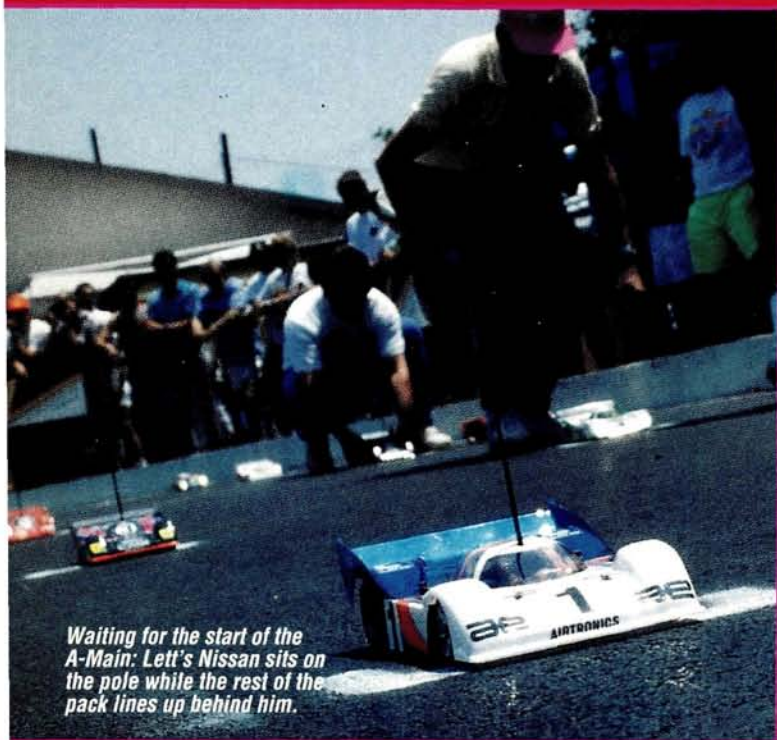


A-Main drivers manned the drivers' stand at the beginning of each Main event.

Andy's R/C Products 1991 ROAR

On-Road Nats

by MIKE LEE



Waiting for the start of the A-Main: Lett's Nissan sits on the pole while the rest of the pack lines up behind him.

THEY COME FROM all over the country on a quest for fame, glory and maybe even sponsorship! Only one person in each class, however, can win the title of National Champion at the annual ROAR On-Road National Championships. Sponsored by Andy's R/C Products, this year's event was held June 13 through 16 at the Ranch Pit Stop Raceway in Pomona, CA. For many drivers, it was four days of hard work. For hometown drivers, this event is a real treat.

The Ranch has hosted more than just a few major races. I last visited this facility for the Trinity/Speedworks Sportsman's Cup, and the track's setup was the same then as it was for the Nats—a 9-turn roadcourse in the center of an asphalt oval track. It isn't a technically tough course, but drivers who know how to make the most of the corners definitely have the advantage. You can still drive fast, but the guys who drive with finesse will always be on top.

The Nationals attract such big-time racing teams as Associated, Delta, Bolink, Peak Performance, Novak, RevTech, Tekin and Trinity. Many of the manufacturers who provide support equipment also attend. They look for a winning car that uses one of their products, giving them a claim to a National title.

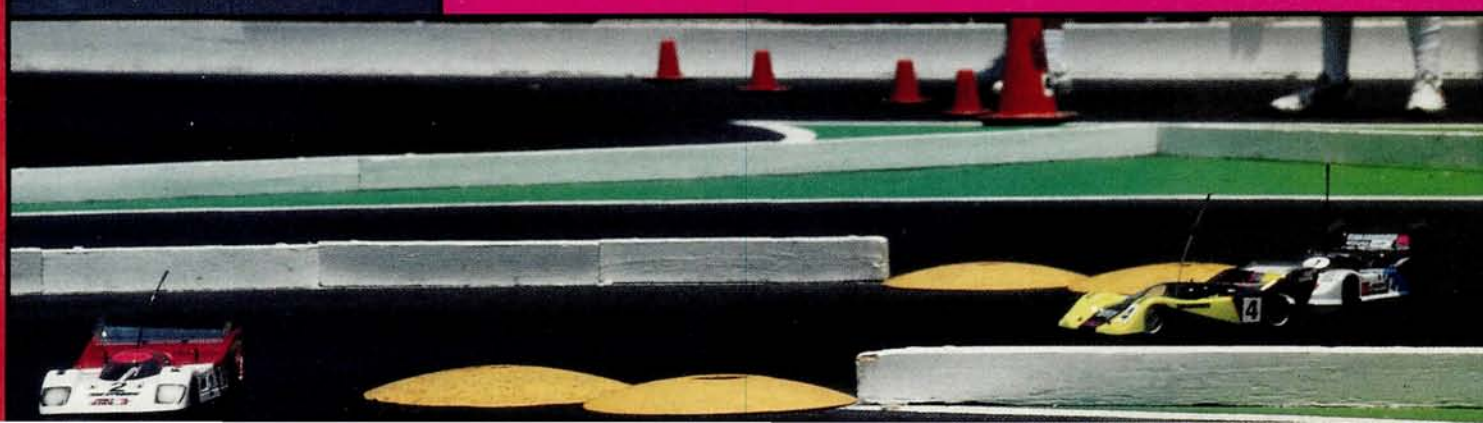


Here are the
Concours entries.

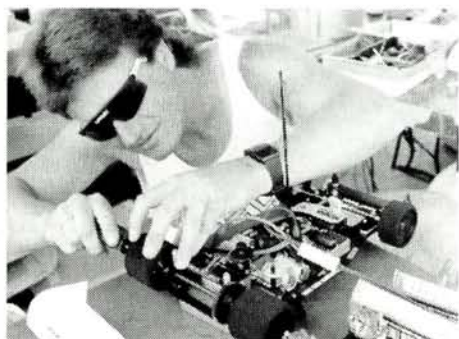
Insane chicane!



The action was very hot; 10 cars vied for the same piece of track, so crashes were inevitable.



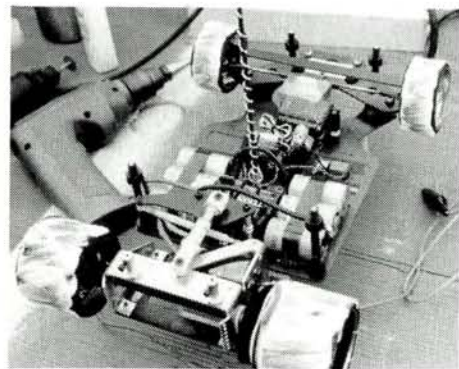
There were 255 entrants—106 in 1/10-Scale Modified, 45 in 1/12-Scale Modified, 74 in 1/10-Scale Stock and 30 in 1/12-Scale Stock. If you were to include all those who were turned away as early as three weeks before the event, the total would easily exceed 400. To complete four qualifying rounds and the Mains, however, the race officials had to draw the line somewhere.



Cliff Lett "wrenches on" his 10L entry. Always a meticulous racer, Lett's attention to detail has paid off with many trips to the winners' circle.

PRACTICE TO QUALIFY?

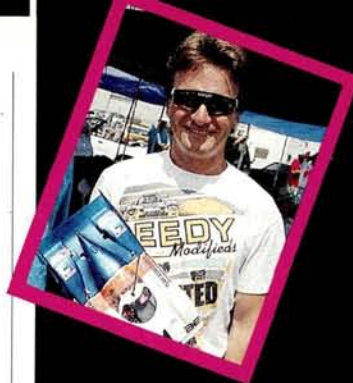
Open practice was held on the first day. The unique system that ROAR used to organize the practice runs worked like a charm. When the drivers registered their cars, they also scheduled practice "tee" times. ROAR officials allowed 10 cars on the track at a time, and they ensured that each driver had a clear frequency and was in the appropriate class. The 1/10-scale cars were allotted 4 minutes; the smaller, 1/12-



Tom Bowlin's Eliminator Pro is Bolink's latest on-road car. Note its innovative rear-pod design with a lateral friction damper just under the main shock. The white stuff on the tires is suntan lotion that was used for traction compound.

scale cars were given 8 minutes. If it were my decision, this would be the only way to organize practice sessions.

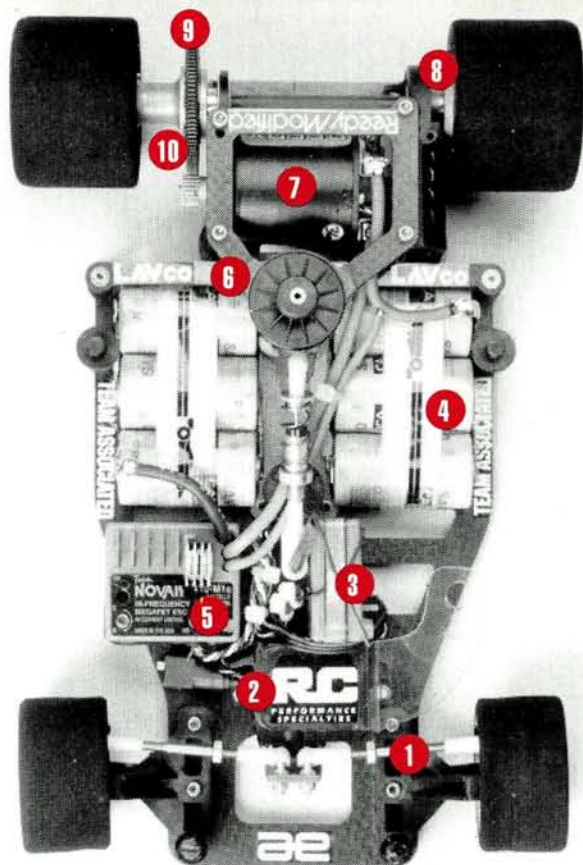
Friday, June 14, was the first day of qualifying, starting with the two qualifiers for each of the Stock Classes. Drivers and support people crowded the otherwise spacious pits, so ROAR officials ran the Stock Class qualifiers in the morning



Attention! This isn't a mistake; it's true! The Michael Jordan of R/C off-road racing has just scored another national title—in on-road competition! Cliff Lett won the 1/12-Scale Modified Class at the '91 ROAR On-Road Nationals!

To take the title, Lett used a new Associated RC12LW car similar to the one used by Chris Doseck to win the 1/12-Scale Class at the IFMAR World Championships (the "w" stands for "worlds"). Unlike Johnson's 10L, Lett's car is basically box-stock. It seems that the secret of his success is a combination of meticulous car preparation and superb driving!

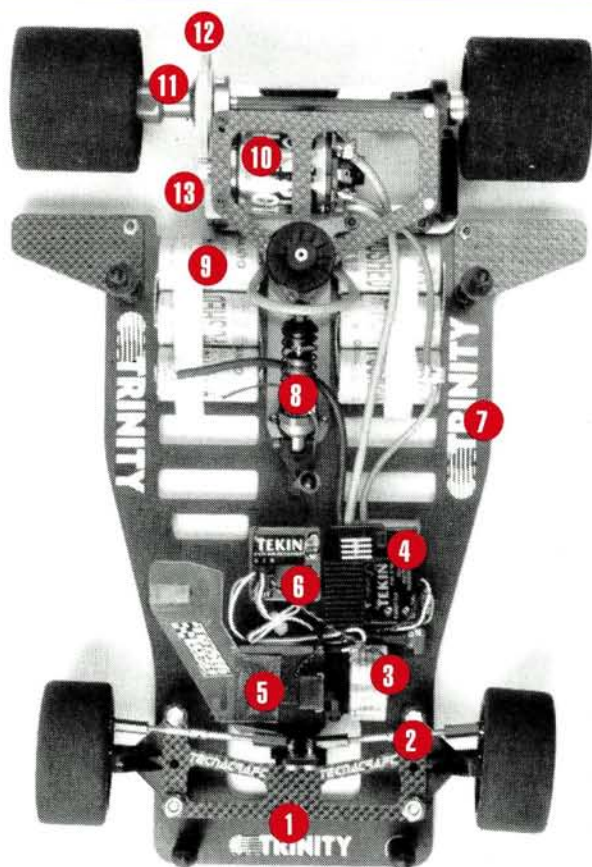
CLIFF LETT'S WINNING ASSOCIATED RC12LW

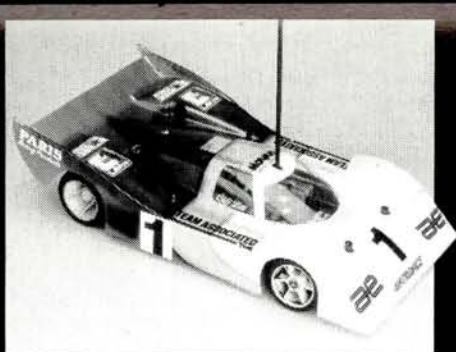


One of the most revered drivers in any scale, Joel Johnson has been driving electric R/C cars since their inception. He has been an A-Main contender in nearly every race he has ever entered. At the '91 ROAR On-Road Nationals, he qualified first in 1/10-Scale Modified and second in 1/12-Scale Modified. Once again, he showed himself capable of racing-winning performance in both scales.

For the most part, Johnson's winning 10L Reflex car has been kept in its stock configuration. To improve performance and increase reliability, however, many stock parts have been replaced with after-market parts.

JOEL JOHNSON'S WINNING RC10L





1. RCPS Titanium tie-rods
2. Airtronics 94143 high-speed servo
3. Novak NER-3FM receiver
4. Reedy matched 1700mAh SCE batteries
5. Novak 410M1c speed controller
6. Teflon tape on the damper plate
7. Reedy 15-turn quad Ultra Series modified motor
8. Light, magnesium axle hubs
9. Team Losi 64-pitch spur gear
10. Ceramic diff balls

and the Modifieds in the evening. This ensured that the Stock Class drivers would leave the pits after they had qualified, making room for the Modified drivers to move in. This system worked well, and it could influence the organization of future events.

For the first time in the history of the ROAR On-Road Nationals, motors with fixed timing—'91 ROAR-legal Kyosho 24-degree motors—were used in the Stock Classes. The result? In many of the Mains, the drivers were separated by only fractions of a second. This shows that the motors are truly uniform. Although they aren't as powerful as earlier stock motors, which came with every degree of timing imaginable, I must admit, they're hard to "burn up."

To qualify for the A-Main, Stock Class drivers had to tag the 17-lap mark. This was incredible, considering that most of the Modified Class drivers only achieved 18 laps to qualify for the A-Main. (I guess the '91 stock motors weren't all that slow!) I can assure you that, after the first day of qualifying, most of the Stock Class drivers did some heavy homework looking for ways to squeeze more power from their stock motors.



ROAR administrator John Thawley and Pops Losi scan the Concours entries and comment on them.

HERE'S THE WIND-UP...

The second day of qualifying was better than the first; the drivers settled into the rhythm of the track and lap times improved. There was a heated moment during the Modified qualifying. Mr. Magic,

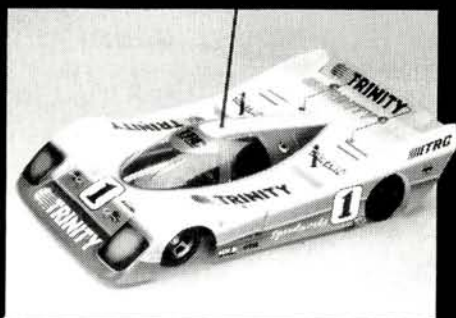
1. HPI graphite front-suspension stiffener plate
2. Tecnacraft titanium tie-rods
3. 5-cell 50mAh receiver pack
4. Tekin prototype TSC 411G Goldfet speed controller
5. Futaba S31SHL indirect drive servo
6. Tekin micro receiver
7. CompositeCraft graphite 10L chassis
8. Associated hard-anodized shocks (0.71 in. long)
9. Trinity "pushed" 1700mAh SCE batteries
10. Trinity Tri-Rotor modified motor
11. Magic Motorsports RC10L diff hub
12. Magic Motorsports 64-pitch spur gear
13. Magic Motorsports heat-sink motor plate



BUMP-CHARGING

Before important races, you used to have to charge your batteries till they just about cooked to ensure a maximum charge. Then you had to rush to the line before the buzzer sounded. Well, topping off your batteries for maximum power and run time is still important, but now there's an easier way to do it—"bump-charging."

Today's chargers can be used with a variety of power sources, so you no longer have to top your batteries off using the source in the pits; you can bring the pits to the track! Just plug a standard peak-detecting charger (12V power input) into a power source that consists of 12 sub-C cells. They'll provide you with enough power and amps to bump-charge your batteries several times. When necessary, you just recharge the 12 cells as if they were two 6-cell packs. Now, you can top off your batteries anytime, anywhere.



Joel Johnson, was trying for another TQ run when he encountered Mike Blackstock's car, which was a lap down. During Johnson's attempt to pass, the two cars collided and spun out. When they recovered, it seems that Blackstock's car again tagged Johnson's car, causing both of them to spin out once more.

...AND THE PITCH!

Apparently, tempers flared. At the end of the qualifier, Blackstock returned to the pit lane in front of the drivers' stand only to discover a rather disturbed Ernie Provetti, Trinity's team manager, throwing his car against the stand. If it weren't for the fast actions of the ROAR officials, the situation may have worsened. Make no mistake; the Nationals are serious.

NOTEWORTHY NEWS

There were two famous competitors who didn't participate in this year's event; one of them was Gil Losi Jr. Oh, he was there, all right, but only as a spectator. He seemed content just to watch some of the finest driving ever performed at the track. Jammin' Jay Halsey was also absent. Although he's known mostly for his achievements in the off-road world, he has also proven himself as a force to be reckoned with in on-road competition. Unfortunately, Jay was sick. Unlike at last year's Off-Road Nats, though, he elected not to push himself and wisely stayed out. His presence was missed.

The event's essence wasn't lost when you left the track. The host motel was jammed with drivers, most of whom were sharing their speed secrets, if not their "jollies." Rick Hohwart stayed in the room next to mine, and he was kind enough give me some advice on tuning the '91 stockers. Later that night, I helped him look for parts for his Delta car. Then, he paid me back by sharing his party with me. Actually, I wasn't invited; the noise kept me up all night, and that made me a part of it. (Never try to sleep if Hohwart and company are in the next room; it may be hazardous to your sanity!)

NO RAIN FOR THE MAINS

Unlike the previous three days, Sunday was sunny and bright—perfect weather for the hottest on-road racing of the year. The day officially began with the Concours Event. I've judged such events on a local level, and it's a tough job. At the Nationals, though, it must be more like, "mission impossible." There were some beautiful cars, many of which probably should have been put on display rather than raced. I

ROAR On-Road Nats A-Main Results

1/10 SCALE MODIFIED

Fin.	Qual.	Name	Chassis	Body	Motor
1	1	Joel Johnson	Trinity Reflex 10	Andy's Lotec	Trinity
2	4	Cliff Lett	Associated 10L	Andy's Lotec	Reedy
3	8	Mike Blackstock	Associated 10L	Andy's Lotec	Reedy Mr. T
4	9	Chris Doseck	Associated 10L	Andy's Lotec	Cam
5	2	Andy Dobson	Lynx II	Bolink Porsche	Trinity
6	5	Terry Rott	Bolink Elim. Pro 10	Bolink Porsche	East Coast
7	6	Rick Hohwart	Bolink	Bolink Porsche	Peak Beast
8	3	Bobby Horan	Associated 10L	Bolink Porsche	Reedy Mr. T
9	7	Ron Rossetti	Bolink	Andy's Lotec	Trinity
10	10	Mark Pavidis	Associated 10L	Assoc. Jaguar	Reedy Mr. J

1/12 SCALE MODIFIED

Fin.	Qual.	Name	Chassis	Body	Motor
1	1	Cliff Lett	Associated 12LW	Assoc. Nissan	Reedy 10T
2	6	Tony Niesinger	Associated 12L	Assoc. XJR10	Reedy
3	5	Terry Rott	Bolink Elim. 12	Bolink Porsche	East Coast
4	4	Mike Ebert	Associated 12L	BBR Lotec	Reedy Mr. K
5	9	Mike Blackstock	Associated 12LW	Assoc. Nissan	Reedy 15T
6	3	Chris Doseck	Associated 12LW	Assoc. Nissan	Cam
7	2	Joel Johnson	Trinity Reflex 12	BBR Lotec	Trinity
8	7	Rick Hohwart	Delta Spyder	BBR Lotec	Peak 15Q
9	8	Frank Killam	Associated 12LW	Assoc. Nissan	Reedy Mr. K
10	10	Frank Calandra	Corally SP12	BBR Lotec	Cam

1/10 SCALE STOCK

Fin.	Qual.	Name	Chassis	Body	Motor
1	2	Jimmy Piersol	Delta Villain	BBR Lotec	
2	3	Scott Williams	Corally SP10	Bud's Nissan	h
3	6	Chris Walrod	Associated 10L	Assoc. Jaguar	a
4	4	Rob Press	Associated 10L	Andy's Lotec	n
5	1	Willy Decker	Corally SP10	Andy's Lotec	d
6	5	James Brown	Associated 10L	BBR Lotec	-
7	9	Mark Baldwin	Associated 10L	Andy's Porsche	o
8	7	Sean Cochran	Delta Villain	BBR Lotec	u
9	10	Joel Gallegos	Associated 10L	BBR Lotec	t
10	8	Marty Desbrow	Bolink	BBR Lotec	

1/12 SCALE STOCK

Fin.	Qual.	Name	Chassis	Body	Motor
1	1	Willy Decker	Corally SP12	BBR Lotec	
2	3	Sean Cochran	Delta Super Spyder	BBR Lotec	h
3	2	Scott Williams	Corally SP12	Bud's Nissan	a
4	4	Jimmy Piersol	Delta Super Spyder	BBR Lotec	n
5	9	Bill Worrel	Corally SP12	Bud's Nissan	d
6	5	Sam Rothschild	ART Agitator	Fast Fashion	-
7	10	Craig Rau	Associated 12L	Andy's Nissan	o
8	8	Mike Skube	ART Agitator	Fast Fashion	u
9	7	Marty Desbrow	Delta Super Spyder	BBR Lotec	t
10	6	Rob Press	Corally SP12	Andy's RK90	

was thankful that I wasn't a judge at the Nats.

There were two categories: Best Paint and Most Realistic. Wie Lin of Sacramento, CA, won the Best Paint award. The paint on his Jaguar XJ-10 looked as if it were disintegrating to reveal the geometric superstructure underneath. Yen Dor painted this car and his own car, which won 2nd place—a talented painter, indeed. The winning car in the Most Realistic

category was owned by Brian Rush of Fresno, CA. It had an Andy's Jaguar body that was painted by Mitch Kato. Carlo Bruno, whose work has been featured in *Car Action* before, took 2nd place with a superb Andy's Lotec BMW that was painted by Tom at Andy's.

STOCK

The 1/12-Scale Stock Classes ran first. Willy Decker, who came all the way from New

Batteries	Tires (f/r)	Radio	ESC	Sponsors
Trinity Pushed	TRC Green (f/r)	KO Propo	Tekin	Trinity, TRC, CompCraft, Tekin, Losi, Kyosho, Magic Motorsports, Tecnacraft
Reedy SCE	Pro-Star Green (f/r)	Airtronics	Novak MXc	Associated, Reedy, Novak, Airtronics, Oakley, Pro-Star, RCPS
Team Smooth	Pro-Star (f/r)	Futaba	Novak MXc	Associated, Reedy, Novak, Paragon, Team Smooth, Bud's, Andy's, Pro-Star
Cam	TRC (f/r)	KO Propo	Novak	Cam, Associated, Novak, TRC
Trinity Pushed	TRC (f/r)	Futaba	Novak	CompCraft, TRC, Trinity, Novak, Futaba
East Coast	Bolink Black/Green	Airtronics	Novak	Bolink, East Coast, Novak, Havoline/Texaco
Team Orion SCE	Pro-Star Green (f/r)	Futaba	Tekin 411P	Peak Perf., Bolink, Tekin, Futaba, Pro-Star, Ojai Valley Glass
MaxCell	Pro-Star Green (f/r)	Airtronics	Novak MXc	Associated, Reedy, Pro-Star, MaxCell, Airtronics, Novak
Trinity	Pro-Star Green (f/r)	Airtronics	Novak MXc	Losi, Andy's, Trinity, Airtronics, Revolution, Novak, Pro-Star, Team Skull
N/A	Pro-Star Green (f/r)	Airtronics	Novak M1c	Associated, Reedy, Airtronics, RCPS

Batteries	Tires (f/r)	Radio	ESC	Sponsors
Reedy SCE	Gomme (f/r)	Airtronics	Novak MXc	Associated, Reedy, Novak, Airtronics, Oakley, Pro-Star, RCPS
Reedy	Pro-Star (f/r)	Futaba	Novak	Associated, Reedy, Futaba, Autographics, Salvino
East Coast	Bolink Black (f/r)	Airtronics	Novak	Bolink, East Coast, Novak, Havoline/Texaco
MaxCell	Gomme (f/r)	Airtronics	Novak M1c	Reedy, Associated, MaxCell, Airtronics, Paragon, Novak, BBR, Du-Mor, GPA Hobbies
Team Smooth	Gomme (f/r)	Futaba	Novak M1c	Associated, Reedy, Paragon, Novak, Team Smooth, Bud's, Andy's, Pro-Star
Cam	Associated (f/r)	KO Propo	Novak	Cam, Associated, Novak, TRC
Trinity Pushed	TRC (f/r)	KO Propo	Tekin	Trinity, Kyosho, TRC, CompCraft, Losi, Tekin, Magic Motorsports, Tecnacraft
Team Orion SCE	Delta Green/Losi Soft	Futaba	Tekin 411P	Peak Perf., Delta, Tekin, Futaba
Pacific	Twinn-K Black (f/r)	Airtronics	Tekin 411P	Associated, Reedy, Tekin, Airtronics, Twinn-K, Autographics, Kimbrough, Pacific
Bullet Matched	Du-Mor PD (f/r)	KO Propo	Tekin 411P	Team Class, Du-Mor, Bullet

Batteries	Tires (f/r)	Radio	ESC	Sponsors
A&D Select	Delta Green (f/r)	Airtronics	Tekin 700	Tru Hobbies, Pro Car, Delta, A&D, Paragon
Leading Edge	PK Green (f/r)	KO Propo	Tekin 420	Du-Mor, Leading Edge, Racers Choice, Team SEMROCC
ERP Blastoff	N/A	Airtronics	Novak	Endurance, Peak Perf., RPM, Scat, Waldo Racing
Endurance	Pro-Star (f/r)	Futaba PCM	Tekin 700	Endurance, Trinity, Andy's
Bullet	Du-Mor PD (f/r)	KO Propo	Novak M1c	Team Class, Du-Mor, Bullet, Paragon
Team Orion	Pro-Star Green (f/r)	Airtronics	Novak	Peak Perf., Team Orion, Airtronics, BBR, D&D Dist.
Prime Time	CKW (f/r)	Futaba	Novak	Bob & Jim's R/C World, Andy's
A&D Select	Delta Green (f/r)	KO Propo	Head Elec.	Delta, A&D, Team Class, Tru Hobbies
MaxCell	HPI Green (f/r)	Airtronics	Nosram PDQ	Paragon, Nosram, MaxCell, D&D Dist.
Team Orion	Pro Cuts Green (f/r)	Kraft	Novak	Losi, Peak Perf., Bolink, Ojai Valley Glass

Batteries	Tires (f/r)	Radio	ESC	Sponsors
Bullet	Du-Mor /Corally	KO Propo	Tekin 411P	Team Class, Du-Mor, Bullet, Paragon
A&D Select	Delta Green (f/r)	KO Propo	Head Elec.	Delta, Pro Car, A&D, Team Class, Tru Hobbies
Leading Edge	TM Green/Black	KO Propo	Tekin 411P	Du-Mor, Leading Edge, Racers Choice, Team SEMROCC
A&D Select	Delta Gold/Green	Airtronics	Tekin 411P	Delta, Pro Car, A&D, Tru Hobbies, Paragon
Advantage	TM Black Dot (f/r)	KO Propo	Tekin 411P	Du-Mor, Advantage, Bud's, TM R/C
SPR	N/A	Futaba	Novak	Fast Fashion, SPR
N/A	TRC (f/r)	Airtronics	Novak M1c	Action R/C, Andy's
N/A	Assoc. Green (f/r)	KO Propo	Tekin 411P	Advanced Racing, B-Sly R/C, Team Kamakaze
Team Orion SCE	Delta Green/Losi Soft	Kraft	Tekin	Losi, Peak Perf., Ojai Valley Glass
Arlington	PK Silver/Green	Futaba	Novak M1c	Endurance, Trinity, Andy's

York to do the TQ honors in the ¹/₁₂-Scale and ¹/₁₀-Scale Stock A-Mains (watch out for this guy in the future!), ran away with the A-Main win. He took off with the lead and then put the car on cruise control for the duration of the race. Sean Cochran took 2nd when Scott Williams dumped his battery on the last lap, leaving him in 3rd place.

The ¹/₁₀-Scale Stock Class A-Main was dominated by Jimmy Piersol who drove a

Delta Villain car. Scott Williams captured 2nd, and Chris Walrod took 3rd. TQer Willy Decker didn't fare very well. In the hairy first turn, he was punted off the track, and this relegated him to the middle of the pack for the rest of the show.

Let me tell ya, the lower Mains were just as hot as the A-Mains. In fact, I heard that some of the day's best races occurred in the lower Mains. In ¹/₁₂-Scale Stock, Larry Wodell won the B-Main, and I won

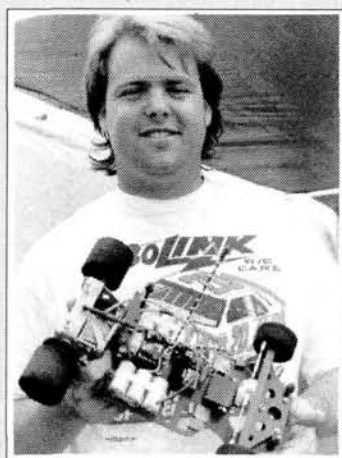
the C-Main. In ¹/₁₀-Scale, Steve Dunlavy won the B-Main, Dave Walsh the C-Main, Gary Nakako the D-Main and Ken Prue (leading wire to wire) the E-Main.

MODIFIED

Johnson sat on the pole of the ¹/₁₀-Scale Modified A-Main. His qualifying time of 4:12.88 was one of two in the 19-lap range. Andy Dobson made the other with a time of 4:13.83. Johnson led the pack,

Winning Products

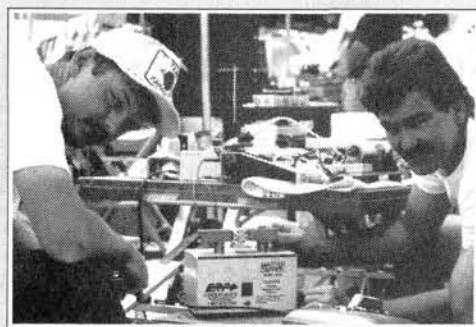
At events like the ROAR On-Road Nationals, it's exciting to see who wins, but it's also interesting to discover what products they used to take the title. Manufacturers often unveil products at major racing events. If a winning driver used any of these new goodies, they would surely become popular immediately. Here are some examples of



new products that were displayed and used at the '91 Nats.

- ROAR acquired an AMB lap-counting system(bottom) in time for the On-Road Nationals. It works with IBM-compatible computers, and it uses a new type of transponder that's designed to work with the latest high-frequency electronic speed controllers. The system performed flawlessly for the entire event.

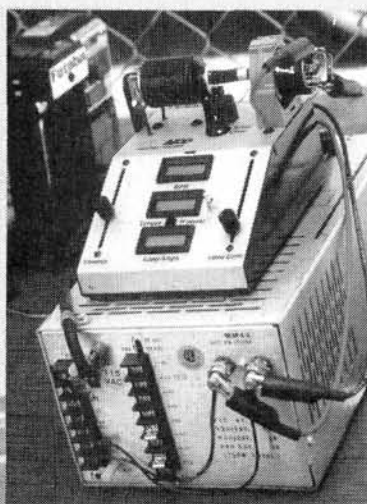
- Endurance Racing Products' Dave Cleveland (top left) was at



the Nats with the Master Zapper motor magnetizer. This unit can improve the performance of most stock motors by effectively increasing their magnetic fields. Throughout the weekend, Stock Class drivers lined up at the ERP tent to have their motors "zapped."

- MaxMod Mini Sports was also at the Nats with its electronic motor dynos(bottom right). You can use these dynos to test your motor and your electronic speed controller! Needless to say, there was also a line of drivers at the MaxMod tent!

- Bolink's Bob Rule was there to support his team. Team members were using the company's latest road vehicle, the Eliminator Pro. The Pro has an innovative rear lateral damper and a completely redesigned rear-pod. Bolink team member Rick Hohwart (left) placed one of them in the Modified Class A-Main, where he seriously challenged 2nd-place driver Cliff Lett before making a driving error (it happens to the best of them!). Watch for this car!



wire to wire, making the A-Main slightly anticlimactic. He was never seriously challenged. When he wins, he likes to bury the field in the process, and that's exactly what he did!

Second-place finisher, the Buggy Master, Cliff Lett, had to do some serious driving. About halfway through, Hohwart charged from the rear of the pack and came a-running after Lett. Hohwart failed to pass him on the first attempt and, during another attempt, he clipped a corner dot and *flew* into the retaining wall. The impact destroyed the rear end of Hohwart's new Bolink. Other than that, this A-Main was placid.

In the 1/12-Scale Modified A-Main, Lett held the pole with Johnson in 2nd. They were both the only drivers to qualify with 35-lap runs, though Lett's time was better by 8 seconds.

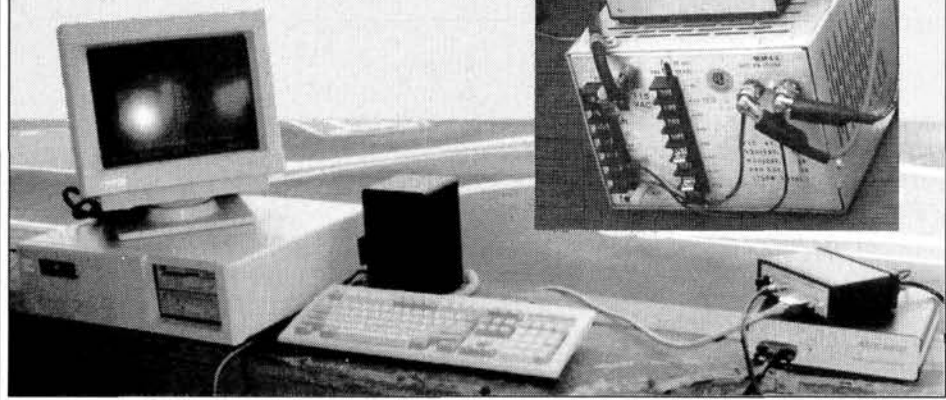
Johnson shadowed Lett all the way to the second corner. At that point, Johnson made his move, but it was fatal. His car clipped a corner dot and "cartwheeled" into another part of the track. He spent the rest of the race trying to make up time. Eventually he did, but in his push to capture the lead, he used up the last of his precious power. His car's battery gave way 30 seconds short of the finish, after he had made up as many as 6 places. Lett walked away with the win.

Tony Niesinger finished in 2nd place. It seemed that he knew what Lett could do and made no attempt to catch him. Instead, he stayed within striking distance of Lett, while keeping plenty of room between himself and 3rd-place finisher Terry Rott.

Some of the best Modified racing occurred in the lower Mains. For some drivers, it was door handle to door handle.

In the 1/10-Scale Modified B-Main, Novak driver Tyree Phillips waxed such top drivers as Kinwald, Burch, Clausen and Furutani. Good job, Tyree! Frank Calandra won the C-Main by less than half a second over Frank Killam. In 1/12-Scale, Kevin Jelich finished just ahead of Dave Berger in the B-Main, and Kenneth Jones took the C-Main beautifully.

Despite the predictable finishes, the '91 ROAR On-Road Nationals was a great event. I've attended many National events, but attending is one thing; participating is another. It's an experience that I'll never forget. Thanks to Andy's R/C Products and the ROAR officials for making this year's racing successful. The On-Road Nats is exciting, so be there in '92! ■



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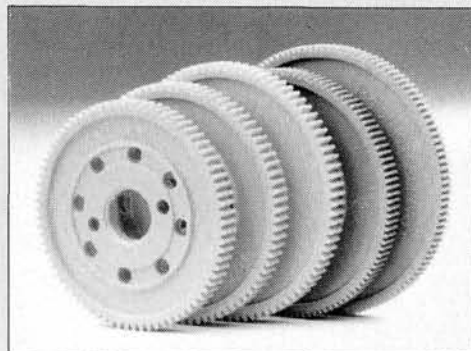
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KYOSHO • Lazer ZX-R 4WD

Kyosho's new 1/10-scale Lazer ZX-R has everything you need to win in 4WD buggy racing. It has a standard 48-pitch, 100-tooth spur gear and 3 1/2-inch-long, front, medium, oil-filled shocks with tapered pistons. A stiff, lightweight graphite chassis and 2.2-inch wheels and tires also contribute to its race-dominating performance. (Motor and ESC aren't included.)

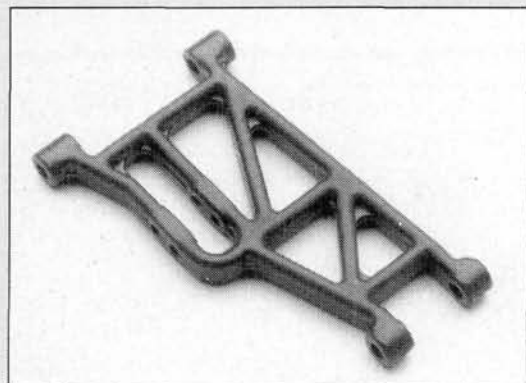
For more information, contact Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61824.



MAGIC MOTORSPORTS • 48- and 64-Pitch Gears

Magic Motorsports' latest gears are designed to fit RC10s, especially those with the new Associated Stealth transmissions. (They can also be used with any diff that uses ceramic diff rings.) They're made of a durable composite material that resists chipping. The shape of their computer-designed teeth reduces parasitic drag, and this increases top speed and lengthens battery life. They're available in 48 pitch (78, 83, 86, 89, 92 and 95 teeth) and 64 pitch (95, 100, 105, 110, 115, 120 and 125 teeth).

For more information, contact Magic Motorsports, 1901 E. Linden Ave. #8, Linden, NJ 07036.



TEAM LOSI • "Swept" Front A-arms

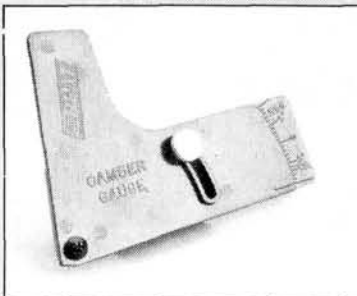
Team Losi introduces its new "swept" front A-arms for Losi buggy and truck kits. Developed through extensive track testing, they provide quicker steering response and enhance jumping abilities—especially important factors on smooth, high-speed indoor tracks.

Part no. A-1013

Price: \$7/pair

For more information, contact Team Losi Inc., 13848 Magnolia Ave., Chino, CA 91710.

Radio Control Racer



RPM

• Precision Camber Gauge

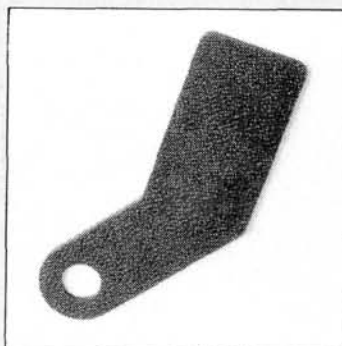
No more guessing or eyeballing your critical camber adjustments! Now you can set them quickly and accurately using RPM's easy-to-read camber gauge. It can measure up to 10 degrees of negative or positive camber.

Part no. 7099

Price: \$9.95

For more information, contact

RPM, 14978 Sierra Bonita Ln., Chino, CA 91710.



DU-MOR R/C

• Universal Transponder Mount

Made of Kydex, Du-Mor's new Universal Transponder Mount is designed to be mounted directly on top of the steering servo. It will work in any 1/12-scale or 1/10-scale on-road car.

Part no. STAR-140

For more information, contact Du-Mor R/C Inc., 1002 Union Landing Rd., Cinnaminson, NJ 08077.



NOVAK ELECTRONICS

• Digi-Peak/Digi-Peak Plus Chargers

- Novak's Digi-Peak constant-current, peak-detecting charger has adjustable pulse (from 0 to 10A output) and linear (from 0 to 5A output) charging modes. To accommodate batteries of different sizes, you can adjust the trickle rate from 0 to 300mAh in the linear mode. In addition to these features, the Digi-Peak Plus has a volt/ammeter LCD, so you can monitor the charging current, the power-source voltage and the battery voltage. Both models feature Novak's high-frequency, 10-bit digital peak-detection circuitry; 100-second lock-out circuitry (to prevent false peaks); a temperature sensor; and Novak's exclusive Solder Pop Fuse.

For more information, contact Novak Electronics Inc., 128-C E. Dyer Rd., Santa Ana, CA 92707.

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Post-Race Maintenance

by FRANK MASI

I'M SURE you've heard the saying, "All battles are won before they are ever fought." Nowhere is this more true than in auto racing of any scale. The well-prepared R/C racer (i.e., the one who has put a great deal of thought into selecting a motor, tires, shock oil, etc.) is most likely to take the trophy home. This kind of preparation resulted in Team Yokomo's sweep of the '89 World Championships. Not only did Yokomo technicians visit the Australian race site months before the event was held, but they also took soil samples back to Japan and duplicated the Aussie track for their team drivers. The soil samples helped them to develop tires for the track's hard-packed surface. This type of preparation is great for factory teams, but most of us

STEP ONE



Maintaining your car properly isn't as hard as you may think. If you adhere to an organized series of steps, you can greatly minimize the time you spend working on your car.

■ **First, find a clean, clutter-free work space. If your workbench starts out organized, it will be a lot easier to keep it that way.**

■ **Remove your car's polycarbonate body and wing, and wash them with mild detergent and water. Don't scrub the body's interior harshly, or you may damage the paint. It's best to remove the dirty tires early on, as they have a tendency to make everything else dirty. There are two common tire-cleaning methods: use soap and water, and scrub the dirt off with a brush (this method works well, but some people may not want their sink to be used as a deluxe tire-washing station); or brush the dry tires clean with a toothbrush (or a similar bristle brush). Both methods are effective.**

BODY AND TIRES

STEP TWO

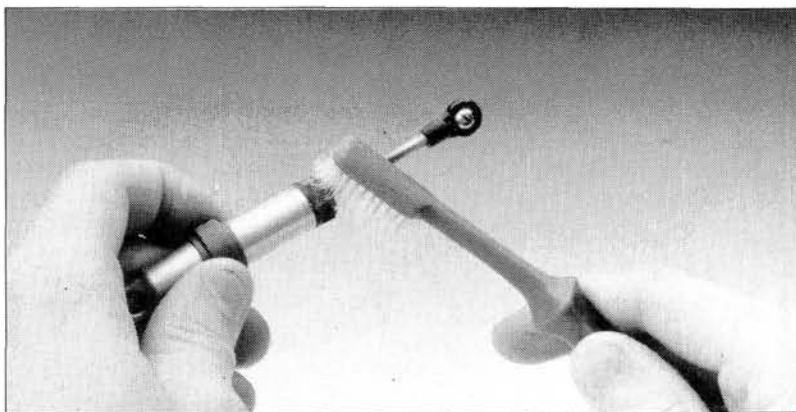
When you've cleaned the body, the wing and the tires, remove the components that are easier to inspect and clean when they're off the car.

- Disconnect (or un-solder) the motor and the battery. Dust off the battery and connect it to a storage resistor or conditioner. (I like to use a 30-ohm resistor that remains on the pack until I'm ready to charge it again.) This completely discharges the cells and equalizes them so that they'll take a more even charge as a pack.

I'm sure I don't need to tell you that your motor should be removed from your car and cleaned thoroughly after *every* run. For those who are new to R/C, I'll explain how to do this. First, take the motor out of the car. This is done for two reasons: it's a lot easier to clean the entire motor properly when it's out of the car; and most motor sprays "attack" polycarbonate gear covers and under-trays.

The most common way to clean an electric motor is to remove the brush springs (put them in a safe place, especially if you're trackside) and then pull the brushes out of the brush hoods. Use a high-quality motor spray (one that won't harm plastics) and thoroughly spray the commutator, the brush hoods, the bearings/bushings and the brushes. Allow all traces of the spray to dissipate, and clean the motor with a *non-abrasive* comm stick, using *very little* pressure, to avoid distorting the commutator (necessitating a rebuild). Next, scrub the surface of the brushes that touch the commutator with the rounded end of an *abrasive* comm stick. This will remove the carbon buildup and de-glaze the brush surface. Always work back and forth in the direction that the commutator rotates. Lubricate the bushings or bearings, and set the motor aside until you're ready to reinstall it.

- After you've cleaned the motor



would have a hard time competing against this kind of legwork. The basic concept, however, should be remembered: Team Yokomo wanted to win the Worlds, so they did everything possible to ensure that it would happen. Masami practically won before the race was ever run.

Most of us don't compete on this level, but the more prepared you are, the bigger the advantage you'll have over the competition. Post-race maintenance is of the utmost importance. No matter how fast you are on the track, it does no good if your tie rod pops off at the 3-minute mark. The tips in this article won't make your car go any faster, but they will enable you to first finish: how else can you finish first!

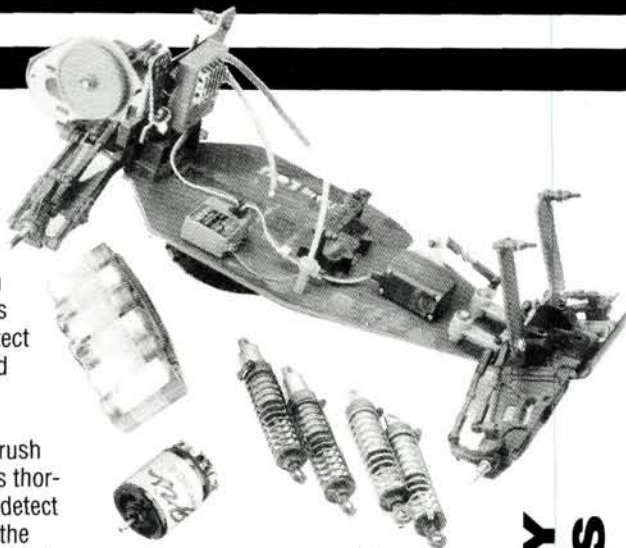
and removed the battery, remove the shocks. I like to remove them from the car because it's much easier to detect any binding caused by dirt buildup around the shock seals. Use a soft brush to clean the shocks thoroughly, and if you detect any binding, open the shock, remove the shaft, and clean the seals. You should change the oil in your shocks after about every three races (an hour or so of running time) because dirt accumulates in the oil and changes its damping qualities.

- Use a paintbrush (or something similar) to clean the rest of the chassis. Compressed air (if it's available) simplifies this task immensely.
- Check all tie-rod ends for wear and, if necessary, replace them.

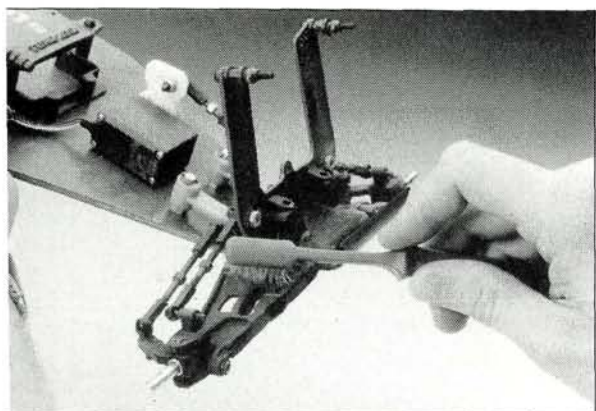
I've seen many good qualifying runs (and mains) cut short by a popped rod end. They cost very little, so you shouldn't hesitate to replace them when they begin to show signs of wear.

- Inspect all electrical components. Make sure that there are no frayed wires and that everything is held securely on the chassis.
- Use a pick or a tiny screwdriver to remove all the dirt that has accumulated on the screws under the chassis. I know that this is a pain, but the longer this stuff sits, the harder it will be to get rid of when you need to remove one of the screws.

MOTOR, BATTERY AND SHOCKS



Clean Machine!



Post-Race Maintenance

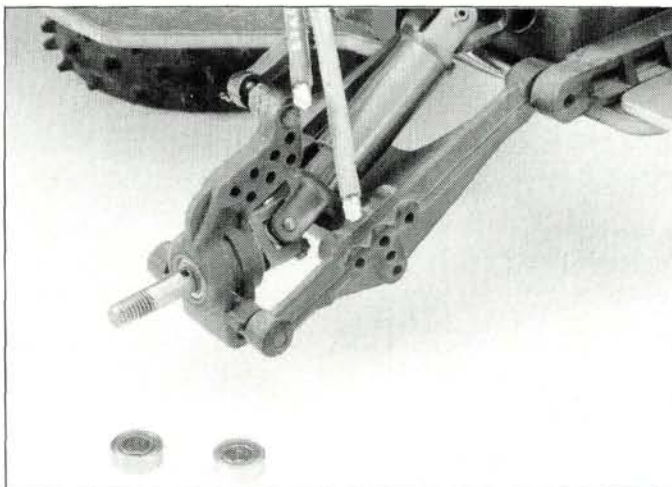
STEP THREE

Because of their locations, some bearings tend to attract more dirt, and they require more maintenance. A little care goes a long way here, and it can substantially increase the life of your bearings.

■ The worst casualties in the dirt-versus-bearings war are the rear-axle bearings, which are always the

first to go. If you race on a dusty track, pop these out and clean them after every race. It's simplest to do this by spraying them with a high-quality motor spray, which works better than conventional solvents because it evaporates without a trace. When the bearings are clean and dry, put a small drop of light oil on them. Don't "over-oil" them because this will create too much drag in the bearing, and the excess oil will attract more dust and dirt.

■ Although they don't get as dirty as the rear axle bearings, the front wheel bearings need attention. Remove them from the wheels and clean them in the same way as you cleaned the rear-axle bearings.



BEARINGS

STEP FOUR

TRANSMISSION

It's always good to remove the transmission from the car, open it up, and give it a once-over. You may discover something that's not noticeable from the outside. With any luck, when you open the transmission you won't be greeted by a lot of dirt or melted plastic. Going on this assumption:

- Remove the internal gears from the case halves; inspect them; and clean them thoroughly with a stiff-bristle brush (not the one you used to clean the tires), or spray them with motor spray (one that won't harm plastics). Look at the gears' teeth; they shouldn't be pointed or sharp. If they are, replace them as



soon as possible.

- Remove the differential assembly and check its action. It should work smoothly and easily; if it doesn't, it's time to rebuild. You should re-

build the diff regularly, depending on the conditions in which you run. Dry, dusty tracks are tough on moving parts such as bearings and diffs. Fine dirt can penetrate even the most effectively sealed transmissions and bearings.

- Most of the transmission bearings probably won't have to be cleaned as frequently. Check each transmission bearing by removing it from the housing and spinning it in your hand. The bearings should spin freely and quietly with no gritty feel or sound. Of all the bearings in your tranny, the ones that will probably require your attention will be the outdrive bearings, so check these first.

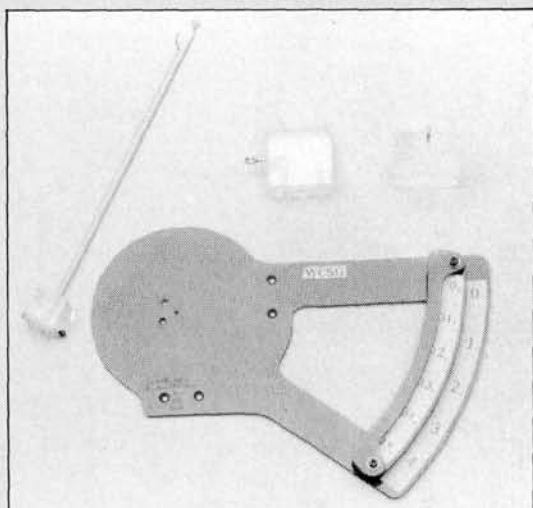
Contrary to popular opinion, racing at a very competitive level doesn't require megabucks. Choosing the right equipment and maintaining it correctly are the keys to success on the track. If you're a relative newcomer to R/C racing or just thinking of starting, go to your local track and check out what the fast guys are using. Of course, there will be racers with thousands of dollars worth of equipment but, take it from me, 75 percent of that equipment does nothing to improve lap times. Some of us are simply gadget freaks. Don't let someone b.s. you into thinking that competitive R/C racing costs a fortune—it doesn't! Buy smart, maintain your equipment, and racing success will follow. Oh yes, PRACTICE! PRACTICE! PRACTICE! ■

HOW TO BUILD A DIFFMETER

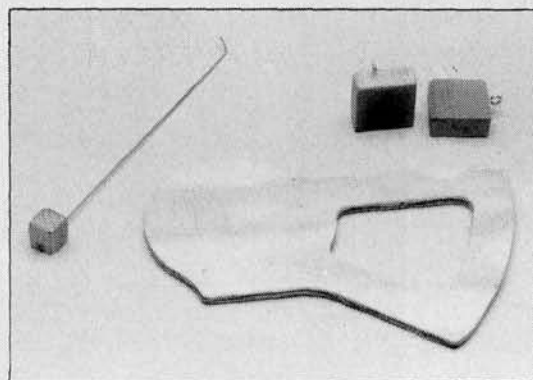
by CHIP WOOD

GET A GRIP ON YOUR SLIP

ANYONE WHO races R/C cars competitively knows that there are only two ways to adjust a ball diff. You can either hold both wheels and try to rotate the spur gear, tightening or loosening the diff until the desired "slip" is achieved, or you can do take-offs on the track, adjusting the diff on the spot. Most racers use both methods, as the former only gets you in the ballpark, and the latter lets you adjust to "real world" conditions. What happens when you finally get the perfect diff setting? It's rebuilding



Building your own diffmeter is fairly simple, and you can use virtually any rigid material for its construction. If plastic is unavailable, wood can be substituted with absolutely no change in the diffmeter's accuracy.

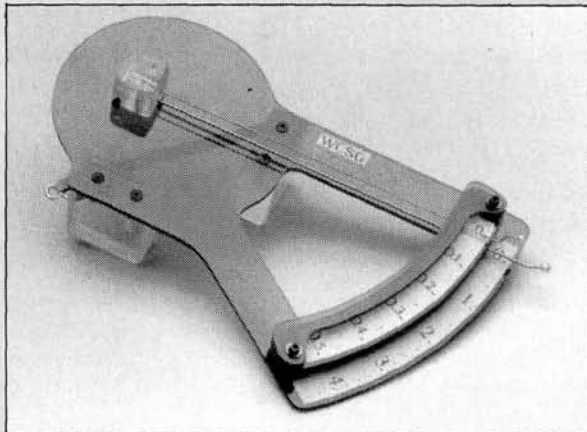


time, and the whole process begins again!

It was only a matter of time before someone developed a device that would enable you to measure the amount of slip present in your differential and your slipper clutch, and let you retain the right settings rebuild after rebuild. Ladies and gentlemen, I give you the diffmeter—the torque-wrench principle applied to R/C car diffs.

Before explaining the diffmeter's construction and operating principles, I'll tell you a little about the ball diff itself. Basically, a ball diff consists of several ball bearings squeezed between two pressure plates. The balls are set in a diff gear which leads directly or indirectly to the motor, and the pressure plates lead to each drive wheel. The ball diff has two functions: it releases the motor from the wheels when necessary, and it can allow the inside wheel to rotate at a slower speed than the outside wheel during cornering.

Some people set their ball diffs loosely to gain traction. Even stock motors can produce enough power to break the tires loose when starting from a dead stop. To reduce this unwanted wheel spin, the diff is loosened until it "slips" for the first few feet. Unfortunately, the friction of the balls slipping on the drive rings creates tremendous heat that can eventually cause the plastic that most diff gears and pulleys are made of to melt.



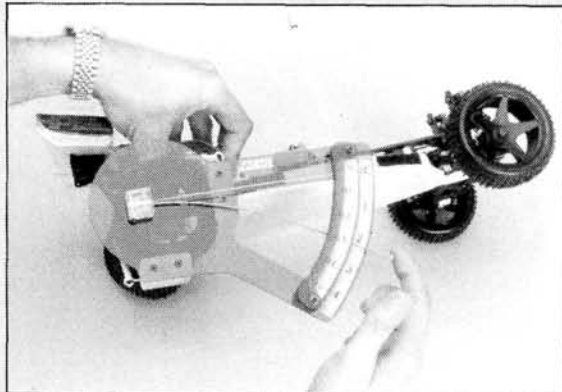
The diffmeter is a simple device that enables you to accurately adjust your ball diff's "slip point" without putting the car on the track. Pictured is a "super diffmeter" that incorporates a smaller-gauge pull wire that allows you to also read your diff's operating friction (see sidebar).



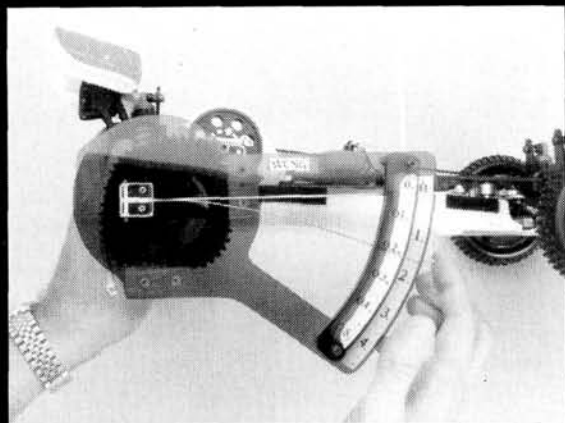
The mounting blocks are attached to the underside of the diffmeter's body. Assemble the diffmeter with glue or screws—your choice!

As you know, when your car goes around a turn, the inside wheel doesn't travel as far as the outside wheel. If your ball diff is too tight, the inside wheel will strain to rotate at the same speed as the outside wheel and it will spin, losing traction. As a result, the car might not turn or accelerate to its potential. If the diff is too loose, however, unwanted wheel spin could result if one drive wheel is on a slippery surface. (This is rare.) How much the drive wheels resist turning at different speeds is the *differential resistance value*, or friction at which the diff operates. This is directly related to how tightly the balls are held between the pressure plates, and it's a factor in tuning your handling.

Many of the latest off-road transmission designs use slipper clutches to limit the torque produced by the motor before it reaches the differential. The slipper clutch is really an acceleration aid for medium- and low-traction surfaces. It's set looser than the ball diff. Your car will accelerate most quickly if its tires are rotating from 9 to 12 percent faster than the car is moving over the ground. Massive tire spin may be spectacular, but it slows accelera-



Operating the diffmeter is simple: attach the unit to one of the drive wheels as shown; hold both the drive gear and the opposite wheel, and pull slowly and gently on the wire.



DIFFERENTIAL RESISTANCE VALUE

As mentioned in the article, a ball differential performs two important functions: it can be adjusted to "declutch" (slip) when a set amount of torque is applied to it; and it allows the opposing driven wheels of a cornering car to rotate at different speeds, because the inside wheel travels a shorter distance than the outside wheel.

Now that you have a basic understanding of the principles upon which a ball diff operates and how to use the diffmeter to set it accurately, I'd like to show you how the same basic idea behind the diffmeter can also measure your diff's resistance value, i.e., how smoothly it operates.

By mounting $\frac{1}{32}$ -inch pull wire instead of (or with) the $\frac{1}{16}$ -inch wire used for the diffmeter, you can accurately gauge this resistance value. Attach the diffmeter to your car as you would if you were measuring the slip point, but hold only the drive gear, not the opposite wheel. Pull on the smaller wire. The meter will tell you how many foot/ounces it takes to operate your diff. The fewer foot/ounces, the smoother your diff, and that translates into a car that will corner better!

tion and interferes with directional control. For example, your car is accelerating out of a slippery hairpin turn. The instant it's going 5mph, the rear wheels should be turning at only 6mph, not 20 or 30mph!

The diffmeter will measure the torque value at which the balls "release," and start skidding around the pressure plates. If the car is equipped with a slipper clutch, it can also be set using the diffmeter and the same principles, except that the slipper should be set to release before the diff does.

Building your very own diffmeter is not extremely difficult. It requires some skill to complete, but ordinary R/C enthusiasts will find that it's within their scope.

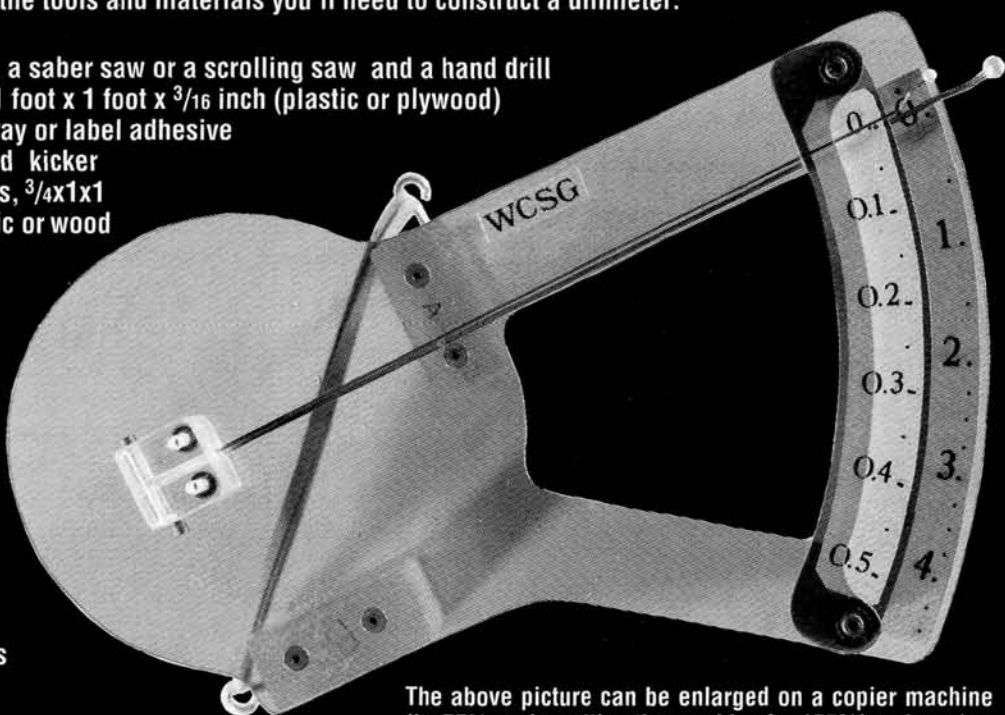
- First, cut the shape of the main body out of either

BUILD A DIFFMETER

Here's a list of the tools and materials you'll need to construct a diffmeter:

- a trim saw, a saber saw or a scrolling saw and a hand drill
- one sheet 1 foot x 1 foot x $\frac{3}{16}$ inch (plastic or plywood)
- graphic spray or label adhesive
- thick CA and kicker
- three blocks, $\frac{3}{4}$ x1x1 inch (plastic or wood)
- two eyelet screws
- $\frac{1}{16}$ -inch piano wire
- several thick rubber bands

Optional:
six $\frac{3}{4}$ -inch flat head screws;
1 or 2 beads



The above picture can be enlarged on a copier machine (by 55%, or by setting the machine for 155%) and used as a template when making your own diffmeter.

the plywood or the plastic sheet. I suggest that you make a photocopy of the template printed with this article and trace it onto the material you've chosen. If you use the plastic, you can use spray adhesive to stick it to the protective paper.

- Then, glue the tire blocks to the bottom as shown. Make sure that the eyelet screws are in the correct position. Mount a buggy wheel and tire against the blocks and mark the wheel's center on the body. Drill a small reference hole here.

- Attach the eyelet screws to the tire blocks as shown in the photos. Stretch two rubber bands between the eyelets

- Next, attach the foot/ounce scale to the main body. Photocopy the picture from the magazine, then secure it to the body with spray adhesive.

- Drill a $\frac{1}{16}$ -inch-diameter hole into one end of the remaining block, approximately 1 inch deep and about $\frac{1}{8}$ inch from the edge. This will be the calibration block, so the hole should be straight! Insert the

$\frac{1}{16}$ -inch wire into the hole and glue it securely into place. Position the calibration block so that the wire's exit point is over the reference hole, and the end of the wire is $\frac{1}{8}$ inch above zero on the scale, and glue it. (This $\frac{1}{8}$ inch will be taken up by the bend that the wire will develop with use).

- If you use clear or smoked plastic for its main body, the diffmeter will have a more professional, "finished" look. You can even use screws to hold the components together. Bend the end of the wire up into a small tab for your finger; you can attach a bead here.

To take an accurate reading, the diffmeter must be horizontal and the car must be on its side. Mount the diffmeter to one of the driven tires and hold the other wheel and spur gear with your left hand. Pull the diffmeter around clockwise with a finger of your right hand on the wire tab. As the diffmeter rotates, the wire will move up the scale until the diff starts to slip. The reading you'll get is the dif-

ferential's slip value. The scale is calibrated in foot/ounces for $\frac{1}{16}$ -inch wire and is relatively accurate. If the reading jumps around a lot, you probably have a dirty diff! Set the slipper in the same way, but make sure that it slips before the diff does. Remember, the wire will start bending permanently if it's pulled much beyond 5 ounces.

Experience with my diffmeter has taught me a lot. I find that I generally use between 3.5 ounces (on slippery tracks) to 4.5 ounces (on high traction surfaces). A lot of people just leave it around 4 ounces and set their slippers from 3.4 to 3.9 ounces. I found that Allen head wrenches didn't allow me to make the fine adjustments that the diffmeter's accurate measurements indicated were necessary. As a result, I made a set of long-handled adjusters. With these, I can make small, accurate adjustments to the diff and slipper.

Good luck with *your* diffmeter. Happy racing, and don't crash in the first turn! ■

HOT TRACKS



CORAL SPRINGS ROADRUNNERS R/C CAR CLUB
Coral Springs, Florida

FUN IN THE SUN! Year-round 1/10-scale off-road racing is what the Coral Springs Roadrunners R/C Car Club offers in beautiful Coral Springs, FL. Since Coral Springs is midway between Miami and Palm Beach, the races draw drivers from all over southern Florida.

The track has been in its current home—a city park with lots of shade—for three years. The park is used exclusively for R/C racing, so club members and guest racers have a quiet, undisturbed racing environment. The Roadrunners recently completed the construction of a new drivers' stand and bought an air-conditioned trailer for the radio-impound area. The Bolink lap-counting system is used, and computerized results are provided.

This non-profit club stresses the importance of a family-oriented atmosphere in which novices are just as important as seasoned "pros." (If certain members of the family prefer shopping to racing, there's a regional mall just two blocks away!) The races are held on alternate Sundays, and practice time is scheduled for every Saturday from 10 a.m. to 1 p.m. Classes include production, stock, pro-stock, stadium truck, stock truck, modified car, modified truck and 4WD car. The club has two long "points seasons" in the fall and spring and a shorter "non-points" season during the summer months.

The track was recently selected as the site for the newly organized Florida Dirt Point series; it's one of the six tracks chosen from those in the entire state to host this event.

For more information, you can reach President Tom Allison at (305) 721-0344, or Treasurer Rick Schwartz at (305) 344-1983, or drop them a line: Coral Springs Roadrunners R/C Car Club, P.O. Box 9632, Coral Springs, FL 33075.

Remember, if you're going to South Florida at any time, take your R/C cars with you. They'll be racing!

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Track Directory

YOUR 1992 TRACK GUIDE

ALABAMA

"Lil" TST R/C Raceway, 32 St. N., Alabama City, AL 35904; (205) 547-0071



ALASKA

ARCORR, Fairbanks St., Anchorage, AK 99507; Leon Fahrenthold, (907) 349-1950 (evenings)



ARIZONA

R/C Sports Mania, 3550 N. 35th Ave., Phoenix, AZ 85028; (602) 272-3165



ARKANSAS

AERCC, Vimy Ridge Rd., Little Rock, AR; (501) 945-7037



Arkansas Int'l. Superspeedway, Rt. 4, Stokes Rd., Pine Bluff, AR, 71602; (501) 247-1488



R-C Wheelz, 2630 Piko Ave., N. Little Rock, AR 72114; (501) 758-3330



CALIFORNIA

California Auto Racers (CAR), 96 San Tomas Aquino Rd., Campbell, CA 95008; (408) 749-9751



Desert R/C Raceway, 39360 3rd St. E., Suite 305, Palmdale, CA 93550; (805) 272-1835



Fast Eddie's R/C Raceway, 3261 Edward Ave., Santa Clara, CA 95054; (408) 986-8256



Frogtown R/C Raceway, Motherlode Hobbies, 3069 Hwy. 49, Angels Camp, CA 95222; (209) 736-4989



Lindsey's R/C Raceway, P.O. Box 443, Doyle, CA 96109; (916) 827-2457



Matt Norris' Fast Track, 8354 Marina Greens, Sacramento, CA 95826; (916) 381-0931



One-Stop Raceway, 3782 Cerritos Ave., Los Alamitos, CA 90720; (213) 493-7597



Paso Robles R/C, P.O. Box 3795 (3980 Linne Rd.), Paso Robles, CA 93447; (805) 237-0624



The Race Place, 13564 E. Imperial Hwy. Unit G, Santa Fe Springs, CA 90670; (213) 926-7711



Radio-Controlled Hobbies, 2011 Placentia Ave., Costa Mesa, CA 92630; (714) 631-1555



R/C Sports, 1009 Alamo Dr., Vacaville, CA 95688; (707) 446-5555



R/C World, 5759 E. Fountain Way, Suite 101, Fresno, CA 93727; (209) 348-9409



Roy's Raceway, 368 E. 11th St., Tracy, CA 95516; (209) 836-3513



SRS Raceway, 915 N. Main St., Salinas, CA 93906; (408) 424-4044



Trains, Planes, Automobiles, 1260 Oddstad, Redwood City, CA 94062; (415) 365-7500



Tyler's R/C R&D, 6865 Flanders #D, San Diego, CA 92121; (619) 597-3072



Woodbridge R/C Speedway, Irvine, CA. Contact Dave Anderson, (714) 551-5007



Yorba Linda R/C Speedway, 3780 Prospect, Suite B, Yorba Linda, CA 92686; (714) 572-2175



COLORADO

Action R/C Raceway, 4939 N. Broadway #57, Boulder, CO 80304; (303) 440-0330



Colorado R/C Speedway, 6520 Wadsworth Blvd. #130, Arvada, CO 80003; (303) 425-1718



Edora Park R/C Speedway, Edora Park, Ft. Collins, CO 80524; (303) 482-0197



R/C World & Track, 2788 S. Federal Blvd., Denver, CO 80236; (303) 789-0838



CONNECTICUT

Connecticut R/C Off-Roads, Old Field School, Mona Terrace, Fairfield, CT 06430; (203) 661-0145



High-Tech Raceway, 374 Enfield St., Enfield, CT 06082; (203) 745-8488



Hobby World Raceways, 161-6 Woodford Ave., Plainville, CT 06062; (203) 793-1111



K/N R/C Speedway Inc., West St., Stafford Springs, CT 06076; (203) 684-9896



R/C Raceways Inc., 1265 John Fitch Blvd., South Windsor, CT 06074; (203) 528-3661



R/C World/Sugar Hollow Speedway, 66 Sugar Hollow Rd., Danbury, CT 06810; (203) 748-2185



Wallingford Indoor Racing, 63 N. Cherry St., Wallingford, CT 06492; (203) 265-3939



FLORIDA

5-fifty-5 Raceway, County Rd. 555, Bartow, FL 33830; (813) 324-7406 (Chuck Nolke)



Branford R/C Speedway, Rt. 3, Box 240, Branford, FL 32008; (904) 935-0758



Coral Springs Roadrunners, P.O. Box 9632, Coral Springs, FL 33075; Tom Allison, (305) 721-0344 or Rick Schwartz, (305) 344-1983



H&H Raceway, 4121 S. Tamiami Tr., Sarasota, FL 34231; (813) 922-7711



Hialeah Hobby Raceway, 4562 W. 12 Ave., Hialeah, FL 33015; (305) 826-3702



Lake Whippoorwill International Speedway, 12345 Narcoossee Rd., Orlando, FL 32827; Bob Hosch, (407) 277-9586; fax (904) 759-3993



Lou's R/C Hobbies & Raceway, 1512 SE Village Green Dr., Port St. Lucie, FL 34952; (407) 337-9000



M&M R/C Raceway, 16921 Waterline Rd., Bradenton, FL 34202; Mike Williams, (813) 747-2889



PBG R/C Motor Park, 4399 Lilac St., Palm Beach Gardens, FL 33410; (407) 524-9252



Pro Hobbies Speedway, 715 N. Lake Pleasant Rd., Apopka, FL 32712; (407) 886-4615



Ray's Track & Hobby, 4605 W. Ca-yuga St., Tampa, FL 33614; (813) 872-8662



Rental Raceway, 3655 S. Hopkins Ave., Titusville, FL 32780; (407) 383-0631



St. Augustine R/C Speedway, 99 Masters Dr., St. Augustine, FL 32095; (904) 824-6357



Sun Valley Speedway, Palmer Blvd., Sarasota, FL 34232; (813) 322-1200; (mailing address: Rt. 1, Box 443N, Myakka City, FL 34251)



West Coast R/C Club, Lake Park, 8607 May Cr., Tampa, FL 33614; (813) 932-3650



Wilbur Avenue Raceway, 1848 Wilbur Ave., Vero Beach, FL 32960; (407) 567-1200



GEORGIA

Case R/C Raceway, P.O. Box 1061, Trenton, GA 30752; (404) 657-6789



Dalton Raceway, 2300 Chattanooga Rd., Dalton, GA 30720; (404) 226-6699



Georgia Hobby Center, 112 Kenwood Rd., Fayetteville, GA 30214; (404) 460-1753



Peach Bowl R/C Speedway, 2035 Westside Ct., Snellville, GA 30278; (404) 985-1448



The Racer's Edge Raceway, 1530 Hwy. 19N, Thomaston, GA 30286; (404) 648-2637 or 648-6534



IDAHO

Falls Hobbies & R/C Raceway, 1515 Northgate Mile, Idaho Falls, ID 83401; (208) 529-8650



ILLINOIS

Ameri-Trac, R3, Box 242, Mattoon, IL 61938; (217) 234-8707



Badlands II, 320 W. Jackson St., Vandalia, IL 62471; (618) 283-2913



Eagle Speedway, 303 N. Plum St., Pontiac, IL 61764; (815) 842-1738



Hobby Town Raceway, 4915 W. Rt. 120, McHenry, IL 60050; Mike Hollingsworth (815) 344-1777



JC Hobbies/Metro Motor Speedway, Metropolis Airport, Metropolis, IL 62960; (618) 524-9979



JMP Raceway, 952 Harrison Ave., Wood River, IL 62095; (618) 258-0297 or -0282



Leisure Hours Hobbies, 2872 Plainfield Rd., Joliet, IL 60435; (815) 439-1477



Lisle Community Park Raceway, 1825 Short St., Lisle, IL 60532; (708) 416-6944 (Jim Bernicky)



Machesney Park, 1220 Shappert Dr., Machesney Park, IL 61111; (815) 282-1311



Monee R/C Raceway, 26049 Ridgeland Ave., Monee, IL 60449; (708) 534-2422



R/C Speed Zone, 1400 E. Lafayette, Bloomington, IL 61701; (309) 662-RACE



Redline Raceway, 921 Harding, Calumet City, IL 60409; (708) 862-8181



Slot Wing Hobbies Race Place, 1615 W. Springfield, Champaign, IL 61821; (217) 359-1920



Smithton Community Park, P.O. Box 8152, Belleville, IL 62221; (618) 236-7569



Superior Raceway, 1706 W. Bradley, Champaign, IL 61821; (217) 359-8073



Valley Farms R/C Raceway, 706 Bypass 20, Cherry Valley, IL 61016; (815) 332-4516



INDIANA

Blaze'n Race'n, Old US #30, Box 6, Hamlet, IN 46532; James Eerndt, (219) 867-1324



CC Hobby & Speedway, RR 1, Box 68, Francesville, IN 47946; (219) 567-2447



KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Automatic lap-counting
- Food available

Track Directory

Gonzo Raceway, 418 Roberts Rd., Chesterton, IN 46304; (219) 980-8409



K&L Hobbies, 7 Raceway, 2751 N. State Rd. 39, La Porte, IN 46350; (219) 324-0353



Mooresville R/C Hobby, 7 Moore St., Mooresville, IN 46158; (317) 831-8877



Mooresville R/C Hobby, 9201 S. State Rd. 67, Camby, IN 46113; (317) 831-8877



PITT, 1244E 700N, Ossian, IN 46777; (219) 622-4591



R/C World of Indiana, RR #2, Box 335, Lynn, IN 47355; (317) 874-2464



Radio Car Craft, 1925 S. Curry Pike, Bloomington, IN 47403; (812) 332-3245



IOWA

Mr. Car Raceway, Central Iowa Fairgrounds, Marshalltown, IA 50158; (515) 483-2234



North Park R/C Speedway, 805 S. Jerome, Algona, IA 50511; (515) 295-9352



Power House Racing, 1200 S. Division St., Creston, IA 50801; (515) 782-4582 or 782-4174



Rotunda Raceway, 101 Bass, RR 1 Box 155A, Storm Lake, IA 50588; (712) 732-4555



SW IA R/C Raceway, Kelley Park, Red Oak, IA 51566; (712) 623-5513



Team Johnson Speedway, Jct. Hwy. 34 & 406, West Burlington, IA 52655; (319) 753-0753



KANSAS

Chad's R/C World & Raceway, 217 Brownie Ave., P.O. Box 76, Scranton, KS 66537; (913) 793-2313



Pittsburg International Mini Speedway, 511 1/2 N. Locust, Pittsburg, KS 66762; (316) 232-1973



R/C Superdome & TQ Pro Shop, 14 East Avenue A, Hutchinson, KS 67501; (316) 665-6633



Spring Creek Raceway, 7257 W. Schilling Rd., Salina, KS 67401; (913) 823-8588



KENTUCKY

Bluegrass Int'l/Perry's R/C Hobbies, 214 Globe St., Radcliff, KY 40160; William Perry, (502) 351-RACE



Fast Lane Hobbies, 6132 Scottsville Rd., Bowling Green, KY 42104; (502) 782-2419



The Lexington Autodrome Raceway, 2753 Richmond Rd., Lexington, KY 40509; (606) 269-7794



Remote-Control Hobby Shop/Raceways, Rt. 8, Box 211, Mayfield, KY 42066; (502) 247-4715



LOUISIANA

Acadiana R/C Hobbies & Raceway, 120 Toledo Dr., Lafayette, LA 70506; (318) 235-5825



Cajun R/C Raceway, Rt. 2, Box 288 Hwy. 343, Church Point, LA 70525; (318) 873-3855



MAINE

Central Maine R/C Speedway, 18 Lithgow Sr., Winslow, ME 04901; (207) 877-2232



Rocket R/C Hobbies, Annabessacook Rd., Winthrop, ME 04364; (207) 377-6910



Team Terminator Off-Road Track, c/o Hobbies Plus, 479C Elm St., Biddeford, ME 04005; (207) 282-8838



The Racers' Club, 85 Hubbard Rd., P.O. Box 160, Berwick, ME 03901; (207) 698-5337



MARYLAND

Cliff's R/C Raceway, 4727 Conowingo Rd., Darlington, MD 21034; Doug, (301) 538-3135



Doug's Hobby Shop Raceway, Rt. 301N, Box 32B, Waldorf, MD 20601; (301) 843-7774



Friendship Off-Road Racers, 1531 Florida Ave., Severn, MD 21144; (301) 551-3050



Off-Road Headquarters Indoor Raceway, 5640 K Sunnyside Ave., Beltsville, MD 20705; (301) 474-1246



Suzie Goose Hobbies, 718 E. Gude Dr., Rockville, MD 20850; (301) 279-2966



MASSACHUSETTS

Archer's Lane R/C Raceway, 11B Washington St. (Rt. 1), S. Attleboro, MA 02730; (508) 399-6762



CKS Raceway, 46 Wilbraham St., Palmer, MA 01069; (413) 283-2260



Megadrome Raceway, North Adams Plaza, Rt. 8, North Adams, MA 01247; (413) 743-7223



Mike's Speedway, Rt. 9, Mt. Farms Mall, Hadley, MA 01035



R/C Hobbies & Speedway, 1311 Purchase St., New Bedford, MA 02740; (508) 991-5040



West St. Hobbies, 114C Main St., Medway, MA 02053; (508) 533-1231



MICHIGAN

Baja Bayou Off-Road Raceway, 5313 West 22 Mile Rd., Tustin, MI 49688; (616) 829-3447



Can-Am Hobbies Speedway Park, 1148 Gratiot, Marysville, MI 48040; (313) 364-3338



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- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
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- AC power
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Cereal City R/C Off-Roaders, 2000 E. Columbia Ave., Battle Creek, MI 49015; (616) 963-2506



Fun Tyme High Banked Oval, Fun Tyme Adventure Park, 6295 E. Saginaw Hwy, Grand Ledge, MI 48837; (517) 655-5503



Ludington R/C Raceway, 1483 N. Dennis Rd., Ludington, MI 49431; (616) 843-4654



Mason County R/C Car Track, West Shore Community College, (611 N. Washington Ave., Ludington, MI 49431) Scottsville, MI 49454; (616) 843-8553 or -4837



More R/C Club, 33538 23 Mile Rd., Chesterfield Township, MI 48047; (313) 773-5918 (Tom Kelly) or 749-9774 (Joe)



Off-Road Speedway, 1940 Lakeville Rd., #28, Oxford, MI 48371; (313) 628-4320



R&L Hobbies, 10334 Portage Rd., Portage, MI 49002; (616) 323-3686



R.G. Enterprises, 600 N. Lafayette, Greenville, MI 48838; (616) 754-4919



USA Raceways, 6083 Dixie Hwy., Bridgeport, MI 48722; (517) 777-7USA



MINNESOTA

Minn-E-Golf & Hobby, 9100 Park Ave., Elk River, MN 55330; (612) 441-8365



MISSISSIPPI

Precision Hobbies, 240 Eisenhower Dr., Biloxi, MS 39531; (601) 388-6346



Small Cars Unlimited, 820 Cooper Rd., Jackson, MS 39212; (601) 372-FAST



MISSOURI

Outback Speedway & Hobby, 2810 Sutton Blvd., Maplewood, MO 63143; (314) 644-3383



R + Hobby, 590 Jungermann Rd., St. Peters, MO 63376; (314) 928-9838



MONTANA

Bozeman R/C Powerhouse Track, west side of the Main Mall, Bozeman, MT 59715; (406) 586-6461



Doug's Hobbies, 5221 Veil of Tears, Jefferson City, MO 65109; (314) 893-5861



Garden City Raceway, 6725 Hwy. 10 West, Missoula, MT 59802; (406) 721-5405



Magic City R/C Raceway, 14th St. W. & Central Ave., Billings, MT 59101; (406) 259-9004



NEW HAMPSHIRE

4-K Racing, 100 Warwick Rd, Winchester, NH 03470; (603) 239-6207



C.T. Hobbies R/C Raceway, 49 Eaton Rd., Auburn, NH 03032; (603) 483-2274



Hobbies Plus R/C Raceway, 14 Celina Ave., Nashua, NH 03063; (603) 882-9200



Hobby Etc., Heritage Place, Rt. 101A, Amherst, NH 03031; (603) 595-8549



R&B Racing, Lily Pond Rd., Gilford, NH 03246; Louie, (603) 524-2909 or Bud (603) 524-1893



NEW JERSEY

Action Raceway, Rt. 295 & Harmony Rd., Gibbstown, NJ 08027; (609) 423-8933



Glassboro's Grand Oval Speedway, 167 S. Delsea Dr., Glassboro, NJ 08028; (609) 863-1551



Hopewell R/C Speedway, 138 West Broad St., Hopewell, NJ 08525; (609) 466-2715



Jackson R/C Racing, Marshall Ave., Jackson, NJ 08527; (908) 905-1593



L.B.R.A. Track, 392 Warburton Pl., Long Branch, NJ 07740; (908) 222-5122



The Race Place, Rt. 33 & 34, Farmingdale, NJ 07727; (908) 938-5215



Radical Raceway & Hobbies, 100 Rt. 17S, Lodi, NJ 07644; (201) 834-6996



Tri-Oval Speedway & R/C Center, 296 S. Main St., Phillipsburg, NJ 08865; (908) 454-2223



Zeppelin Hobbies & Raceway, 92 Rte. 23N, Riverdale, NJ 07457; (201) 831-7717



NEW MEXICO

Racers Inn, 4300 Rankin Ln. NE, Albuquerque, NM 87107; (505) 345-5988



NEW YORK

A&D's FasTracks, 1000 N. Main St., Brewster, NY 10509; (914) 279-2065



A&S Race Center & Hobbies, 120 Cayuga St., Canalview Mall, Fulton, NY 13069; (315) 598-2772



Bellmore Raceway, 2479 Charles Ct., Bellmore, NY 11710; (516) 783-3456 or 783-0105



Cars R/C & Guitars, 4360 Seneca St., West Seneca, NY 14224; (716) 674-0905



Dirt Track, 17 Fairway Dr., Manorville, NY 11949; Billy Wroblewski (516) 878-0737



East End Off-Roaders, Route 25A at Gull's Square, Wading River, NY 11792; (516) 929-8844



Island Hobbies & Raceway, 410 Commack Rd., Deer Park, NY 11729; (516) 254-6229



Lakeside Raceway & Hobbies, 712 Willow Ave., Ithaca, NY 14850; (607) 272-0248



Latest Hobbies & Raceway, Rt. 25A, Wading River, NY 11792; (516) 929-8844



LI 1/4-Scale Racers, 63 Horton Dr., Huntington Station, NY 11746; (516) 351-5384



Maspeth Raceway, Rust St. & 57th Rd., Maspeth, NY 11378; (718) 894-0800



Queens Off-Roaders, 42-12 13th St., Long Island City, NY 11101; (718) 392-5766



Track Directory

R/C Competition Corner, K-Mart Plaza, Mattydale, NY 13211; (315) 455-8718



R/C Hobbies, Rt. 49, Box 138, Constantia, NY 13044; (315) 623-9536



Riverside R/C & Hobby, P.O. Box 125, Rt. 126, Beaver Falls, NY 13305; (315) 346-1682



Russet's R/C Racetrack, 1793 Ridge Rd., Ontario, NY 14519; (315) 524-2522



Schoharie Co. R/C Car Club, P.O. Box 126, Cobleskill, NY 12043; (518) 234-4600



Skaneateles Raceway & Hobby, P.O. Box 102, Rt. 20, W. Genesee St., Skaneateles, NY 13152; (315) 685-8077



Walt's Hobby, 2 Dwight Park Dr., Syracuse, NY 13209; (315) 453-2291



NORTH CAROLINA

Cape Fear Speedway, 107 Harley Rd., Wilmington, NC 28401; (919) 762-1184



Carolina R/C Drag Assoc., 907-C Warsaw Rd., Clinton, NC 28328; (919) 592-9489



Charlotte R/C Raceway & Hobbies, 5820 Old Concord Rd., Charlotte, NC 28213; (704) 597-0608



Granite City R/C Raceway, 192-1 N. Main St., Mt. Airy, NC 27030; (919) 786-1466



Jacksonville International Speedway, Hwy. 17N, Jacksonville, NC 28540; (919) 346-1522



Joe's Hobby Shop & Raceway, Rt. 2, Box 682-B, Bessemer City, NC 28016; (704) 435-2912



Mountain R/C Raceway, Hwy. 107N, P.O. Box 67, Glenville, NC 28736; (704) 743-3709



Reedy Creek Raceway, Rt. 14, Box 946, Conard Sowers Rd., Lexington, NC 27292; (704) 731-4022



Sandhills Raceway, Inc., US #1 South, Aberdeen, NC 28315; (919) 944-7414



Smiley Face Raceway, 120 W. Center St., Mebane, NC 27302; (919) 563-3822



TLC R/C Raceway, Rt. 6, Box 321-A, Hwy. 601, Mocksville, NC 27028; (704) 492-7569



NORTH DAKOTA

Crystal Springs Off-Road, 1200 53 Ave. SW, Minot, ND 58701; (701) 852-9590



OHIO

Alcraft's R/C Raceway, 1370 Custer-Orangeville Rd., Brookfield, OH 44403; (216) 448-1573



CRC Raceway/Toy Train Hobbies, 1015 Lower Bellbrook, Xenia, OH 45385; (513) 372-6806



Hobby Main Raceway, 6597 Route 244, Lowellville, OH 44436; (216) 536-8282



Innovative Hobbies/Lakeside Speedway, 3427 Manchester Rd., Akron, OH 44319; (216) 645-1333



KAR R/C Raceway, 14511 Seacrist Rd., Salem, OH 44460; (216) 537-4039



Mid-Ohio R/C Raceway, 5367 Fishburg Rd., Huber Heights, OH 45424; (513) 233-2807



Way Out Hobbies, 5583 Centerpoint Rd., Georgetown, OH 45121; (513) 375-4984



OKLAHOMA

Off-Road R/C Autos of Tulsa, 13349 E. 11th #B, Tulsa, OK; (918) 251-5592



OKC Raceway, 6707 NW 10th, Oklahoma City, OK; (405) 495-4820



RCRC of Oklahoma, 400 S. Vermont, Suite 104, Oklahoma City, OK 73108; Robert Jones, (405) 942-RCRC



OREGON

Buggy Boogie Race Track, Rt. 4, Box 546, Astoria/Knapka, OR 97103; (503) 458-5357



R/C Plus Hobbies Raceway, 2029 25th St. SE, Salem, OR 97302; (503) 364-9188



R/C Speed Center, 2810 N. Pacific Hwy., Medford, OR 97501; (503) 779-8298



PENNSYLVANIA

Brian's Raceway, 733 Flexer Ave., Allentown, PA 18103; (215) 435-1862



Clearfield R/C Car Club, P.O. Box 297, Clark Hill Rd., Hyde, PA 16843; Joe Welch (814) 765-3045



Cressona Mall Speedway, Rt. 61, Pottsville, PA 17901; (717) 385-3506



East St. Raceway & Art Center, 747 E. Railroad Ave., Verona, PA 15147; (412) 826-0602



High-Tek Hobbies Raceway, 13250 Rt. 30, North Huntingdon, PA 15642; (412) 864-5278



Koontz's Home & Hobby Center, 1205 Hoover St., Pittsburgh, PA 15204; (412) 331-3866



L&R R/C Racing, 15 S. Main St., Red Lion, PA 17356; (717) 244-1108



Modellbahn Ott Hobbies, 1145 E. Philadelphia Ave. (Rt. 73), Gilbertsville, PA 19525; (215) 367-5925



Performance Hobby, 1305 Main St., Slatington, PA 18080; (215) 760-9855



Prop & Wheels Raceway, 139 W. Broadway, Tamaqua, PA 18252; (717) 668-2288



Radio Controlled Pro Speedway, Rt. 487N, Stillwater, PA 17878; (717) 387-0266



T&T Radio Controlled Racing, Randolph Rd., Great Band, PA 18821; (607) 723-9357



Wagonhill Hobbyland, RD3, Box 183,
Slippery Rock, PA 16057; (412) 458-
4711



RHODE ISLAND

East Bay Hobbies, 629 Metacom Ave.,
Bristol, RI 02809; (401) 254-0778



R/C Hobbies, 47 Sandybottom Rd.,
Coventry, RI 02816; (401) 823-4335



SOUTH CAROLINA

Berea R/C Speedway, 707 Sulphur
Springs Rd., Greenville, SC 29611;
(803) 246-4702



Inland R/C Speedway, 61 New Found
Ln., Myrtle Beach, SC 29577; (803)
293-1753



LB Co. Hurricane, 112 Green Acres
Rd., Blythwood, SC 29016; (803) 786-
0984



Palmetto Raceway, 5023A Rivers
Ave., N. Charleston, SC 29418; (803)
566-0068



TBS Superspeedway, Hwy. 151,
Darlington, SC 29532; (803) 395-
1551 or 332-7117



SOUTH DAKOTA

Dakota Off-Road Racers, 2989 W. Br.
Co. 12, Aberdeen, SD 57401; (605)
226-0604



TENNESSEE

D&M's Downtown Raceway, 8 North
White St., Athens, TN 37303; (615)
745-4288



The Dirt Dome, 575 W. Poplar Ave.,
Memphis/Collierville, TN 38017; (901)
853-3428



TEXAS

Budget Raceway, RR 1, Box 400 I-35,
Bruceville, TX 76630; (814) 859-5296



Finish Line Hobby Store & Raceway,
11925 Jones Maltsberger, San Anto-
nio, TX 78016; (512) 491-0088



Hal's R/C Raceway, 1440 Bessemer,
El Paso, TX 79936; (915) 591-2213



Hi-Tech Hobbies, 1107 Port Neches
Ave., Port Neches, TX 77651; (409)
724-2391



Indy R/C World, 220 Mesquite Vil-
lage, Mesquite, TX 75150; (214) 686-
7744



Norm's R/C Hobbies & Raceway,
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RACEWAY



Track Directory

R/C Pro Shop, 3303 N. Midkiff, Midland, TX 79705



Spring Creek R/C, 45 Fisherman's Rd., San Angelo, TX 76904; (915) 944-3850



TK's R/C Park, 2921 Old Claude Hwy., Amarillo, TX 79101; (806) 622-0017



Z Track, 1550 Dunnam Dr., Abilene, TX 79602; Chi Chi, (915) 692-8477



UTAH

W.O.R. Raceway, 3150 Brinker Ave., Ogden, UT 84401



VERMONT

Mikes Hobbies & Raceway, 162 N. Main St., Rutland, VT 05701; (802) 775-0059



Silver Towers Raceway, Elks Club, North Ave., Burlington, VT 05401; (802) 658-4490



VIRGINIA

Bob's Hobbies & Raceway, 910-J Brandycreek Dr., Mechanicsville, VA 23111; (804) 746-2758



Cooper's R/C Raceway, Rt. 4, Box 12203, Chatham, VA 24531; (804) 724-4182



Mid Atlantic Raceway, 89 E. Elizabeth St., Harrisburg, VA 22801; (703) 433-3952



The Race Place, 3180 King William Ave., Westpoint, VA 23181; (804) 843-4933



Winners Circle, 3236 W. Clay St., Richmond, VA 23230; (804) 355-7076



WASHINGTON

Alfie's, 108 South K St., Aberdeen, WA 98520; (206) 533-6638



Four Seasons R/C Racing, 146 School St. SE, Olympia, WA 98506; (206) 491-2430



Hank Perry Race Complex, Sullivan Rd., WA 99213; (509) 927-1879



Tacoma R/C Raceway Hobbies, 6305 6th Ave., Tacoma, WA 98406; (206) 565-1935



WEST VIRGINIA

R/C Race Place, Rt. 10, Box 351, Morgantown, WV 26505; (304) 292-0811



WISCONSIN

Frog's R/C Raceway, Rt. 1, Phillips, WI 54555; (715) 339-2314 or 339-2958



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GEAR IT UP

(Continued from page 78)

of paper between the pinion and the spur gear. This gives it the right amount of slack.

What does it all come down to? You should experiment with different gear ratios to find out which works best for you. I hope that you're now a little more knowledgeable about gear ratios and that you have a better understanding of how to set up your car for optimum use. Good luck and good racing. ■

CITY HALL

(Continued from page 56)

the electrical service was turned down, but we learned a few things in the process:

- Be prepared. Don't make any requests unless you can back them up with hard data.
- The city doesn't have a bottomless treasury. Remember, you're one of many with your hand out.

(Continued on page 142)

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CITY HALL

(Continued from page 136)

• Be patient. Even though you might feel your needs take priority, other organizations feel the same way.

I asked our mayor, Jeannie Mills, what we could do to reverse the decision, and she explained the proper procedure. I invited her and City Manager "Buzz" Eddy to the track. Impressed with our operation, they said we could proceed with the project as long as we paid the bills. Were we back where we started?—not really. After we provided the city with the technical data and received the approval of the entire city commission, the city decided to bid on the project. Their price was \$2,500, and an agreement was drawn up whereby the city would install the electricity and the club would pay for it over five years. Patience, compromise and diplomacy—it worked.

Things went smoothly until a city inspector came to the track to check out the installation. That's when the words that pierced my heart like an arrow were spoken: "This drivers' stand and radio-impound shed were constructed without permits, and they're unsafe. They'll have to be torn down." What had I done? If I hadn't started on the electricity, we wouldn't be in this mess. But again, city officials came through; they provided us with a flatbed trailer on every race day while we built another drivers' stand.

• Cooperate. It pays off. We had established a good relationship with the city. Building the drivers' stand to meet city codes was a huge undertaking but, fortunately, our vice president, Vinnie Fusco, is a general contractor. After meeting with building department officials, we designed a stand that met the city's code and our requirements. People were very helpful as they walked us through unfa-

(Continued on page 152)

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CITY HALL

(Continued from page 142)

miliar bureaucratic territory. This time, the building inspector gave the site his seal of approval.

• Do it right the first time, and your mistakes won't come back to haunt you.

All our work has paid off. Our track has been selected as the site for the newly established ROAR Florida Dirt Association Point Series. We now have a first-class facility that has enabled us to attract more racers and raise additional funds so that we can make more improvements. We even have an air-conditioned trailer for the computers and the radio impound. We've also received a lot of help from local businesses, and their support has helped to keep membership fees to a minimum.

The philosophy of the city of Coral Springs has always been to provide top-notch, family-oriented, recreational facilities. The new philosophy of our club is that you don't have to fight city hall to win.

SCOPING OUT

(Continued from page 77)

on the ESC till the car stopped.

To make a long story short, I found that the best setting for my ESC/transmitter combination was to set the transmitter throttle trim to max forward and then adjust the ESC neutral pot so that the motor stopped running when I released the trigger.

With the Pullman working, I headed to a local dirt track to dump a few battery packs. The controller worked flawlessly: run times were good, acceleration was very strong, throttle action was smooth and braking was strong. I checked the

(Continued on page 158)

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SCOPING OUT

(Continued from page 152)

heat sinks after each run, and they were only slightly warm. As I always say, happiness is a having a good car screaming around a track, kicking dirt into the air!

So has the "Green Monster" arrived? Well, the SCIPullman is definitely green, and it's definitely strong, so the name might apply! It will work well in a monster truck—especially one equipped with several modified motors—and it should also be at home in a pulling machine. It survived 100 amps pumped from a 28-cell battery pack, and that should put it into the thick of things at any pulling track.

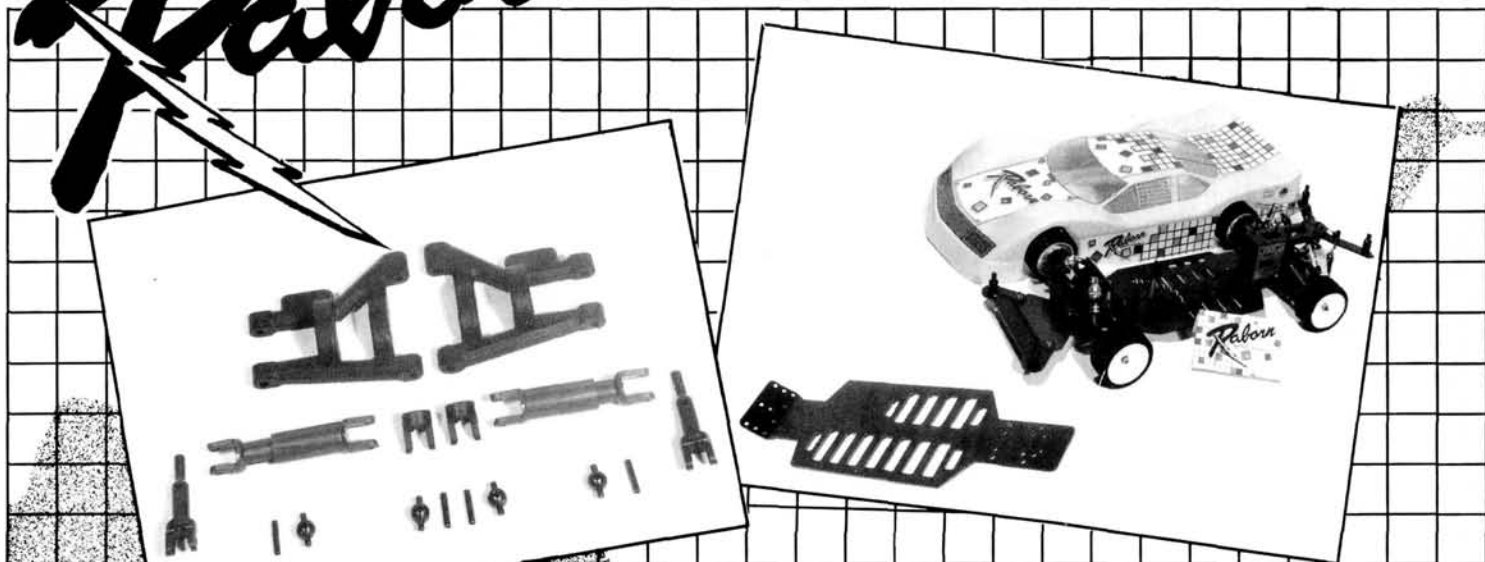
What's the secret of the Pullman's strong performance?—lots of FETs. A few things bothered me:

- the absence of a full-speed adjustment pot;
- the lack of detailed installation instructions (I *did*, however, manage to set up the Pullman so that it would go from neutral to full speed when I adjusted the transmitter throttle trim);

(Continued on page 168)

Raborn

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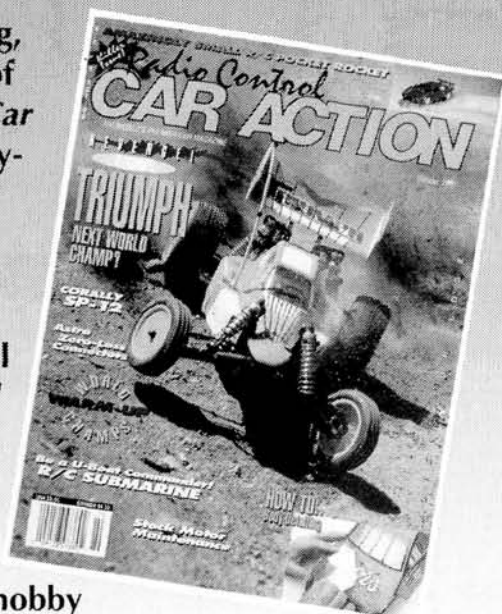
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SCOPING OUT

(Continued from page 158)

- the absence of an on/off switch (I cut the protruding loop of BEC wire according to the instructions, and installed a switch);
- the supplied connectors, which aren't very efficient; if you plan to do any pulling, replace them. (I chose Litespeed* connectors.) When you replace the connectors, it's quite easy to keep things straight because the Pullman has blue and white motor leads and red and black battery wires. The wires, especially the motor wires, are too short to be direct-wired, but if you wanted to direct-wire the motor, you could splice on longer wires. (Just remember to cover the splices with shrink tubing.) Shorted motor leads can make a mess of your battery pack and destroy your controller in a hurry.

The Pullman came with a full set of connectors that are compatible with the style found on most inexpensive batteries, so installing it in my R/C vehicle was easy. Beginners who encounter installation or set-up problems should probably seek the advice of more experienced hobbyists.

(Continued on page 170)

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SCOPING OUT

(Continued from page 168)

rienced modelers. All things considered, the SCI Pullman checks out as a first-class ESC.

**Here are the addresses of the companies mentioned in this article:*

SCI Corp. of America, P.O. Box 13099, Sarasota, FL 34278.

Litespeed, P.O. Box 4765, Spokane, WA 99202.

JUNIOR T

(Continued from page 89)

make assembly difficult. To fix this, simply deburr their edges with a sharp instrument. Don't take off too much metal, or the pins will be loose and fall out. To get the pins started more easily, I use a fine file to chamfer the roll pins' leading edges. Once you get them started, they're easy to press in. Some mention should be made of this in the instructions; otherwise, beginners may be discouraged.

If you follow the kit's instructions, you can't go wrong. It takes about four hours to assemble the chassis. Painting is an-

(Continued on page 183)

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JUNIOR T

(Continued from page 170)

other story! If you're like me, the paint job will take longer than the assembly. Fortunately, this kit came with a beautifully airbrushed Team Losi body.

PERFORMANCE

Now it's time to have some fun. Off to the track I go, with several fully charged battery packs, my trusty Nikon camera, and a roll of Kodak's finest film. I always take the static shots first, while the body is still in good shape. Then I run some hot laps to get the feel of the wheels and make some adjustments to the chassis and diff.

The Junior T handled quite well right out of the box. It seemed to require a heavier shock oil in the rear, increased spring tension all around, and some camber and toe adjustment, but I'll fix all these things before the next club race. The Junior T was controllable enough for the photo session.

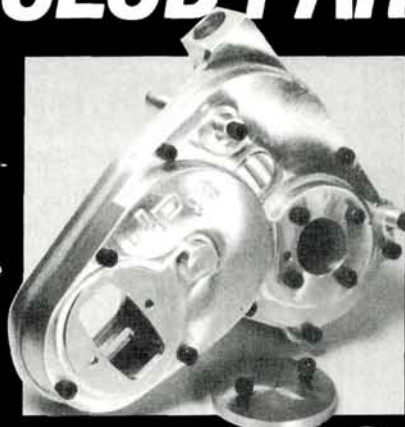
I handed the controls over to Adam Grant (one of the local track's heroes) who put the Junior T through some high-speed turns and the super jump in the

(Continued on page 190)

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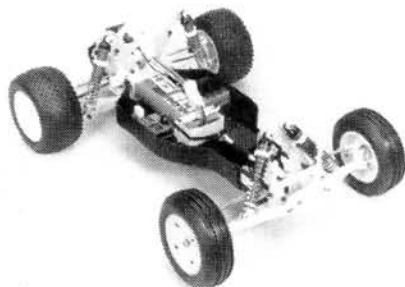


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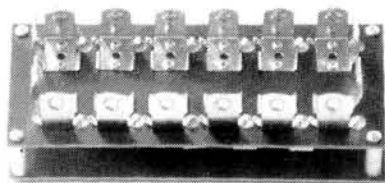
ASSOCIATED ELECTRICS RC10T Truck Kit

Roger Curtis, Cliff Lett and Curtis Husting combined their design experience to produce the Associated RC10T Truck. It has a black aluminum chassis, the award-winning Stealth transmission, new, improved, Teflon-coated hard-anodized shocks and ball bearings. This kit also features new shock struts and body mounts, new dogbones, new links, both narrow and wide front tires, new, wider front A-arms, a new, heavy-duty servo-saver and a new front bulkhead.

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Price: \$335

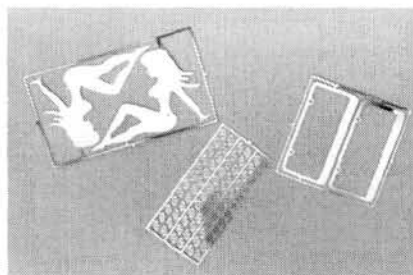
For more information, contact Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626.



TEAM SMOOTH Pro Discharger

Team Smooth's new Pro Discharger lengthens battery life by individually discharging each cell on its own circuit. This is better for battery life and performance than common discharging methods. It comes ready to use; it's the pros' choice!

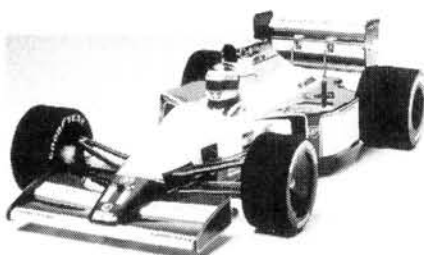
For more information, contact Team Smooth Inc., 10 Birdsong Court, Oldsmar, FL 34677.



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Detail Master has introduced a line of detailing accessories for 1/10-scale R/C cars. These thin, stainless-steel parts have a bright finish, and they add a special accent to any concours or show body. Available are Custom Scripts Performance Scripts, License Plate Frames, Truckmates (Sitting or Reclining), Windshield Clips for stock cars, and Quick Turn Fasteners for drag cars and on-road cars.

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The Lotus 102B Judd Formula 1 car has Tamiya's famous stars on its nose and "Tamiya" spelled out in big letters on both sides of its nose and wing. The kit includes a fiberglass-reinforced plastic deck chassis; an independent, coil-spring front suspension; and a single-point, coil-over, oil-filled rear shock. The polycarbonate body has many of the details found on the full-size Lotus 102B.

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For more information, contact MRC, 200 Carter Dr., Edison, NJ 08817.



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Part no. 081305

Price: \$72.95

For more information, contact Global Hobby Distributors, 18480 Bandilier Circle, Fountain Valley, CA 92728.



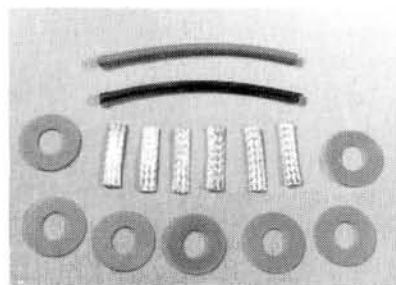
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For more information, contact Holeshot Racing Products, P.O. Box 630, Canton, MA 02021.



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For more information, contact Hunt Manufacturing Co., 230 S. Broad St., Philadelphia, PA 19102.

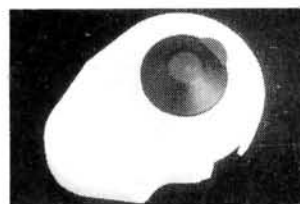


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JUNIOR T

(Continued from page 183)

middle of the track while I captured the event for posterity on film. Within a few laps, Adam was making the truck do tricks. His reaction to its handling and acceleration was positive, but he could detect an inclination to oversteer. This is likely the result of the H-arm rear suspension, which makes the chassis super-responsive in turns. Adam was really impressed with the way the truck came out of turns and took the big jump.

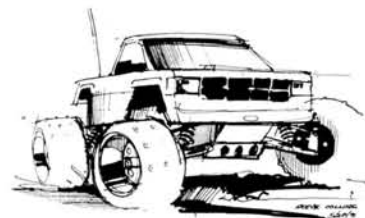
The real challenge came the following week. The Junior T was up against a host of well-equipped "big brother" JR-XTs. The track was very rough with wash-board turns and large hills and gullies everywhere.

Although the H-arm suspension system isn't best for this kind of track, it performed well. I managed to place second in both qualifying heats and qualified second in the A-Main right behind Adam Grant. The A-Main was a *real* challenge. Adam's JR-XT had the advantage in rough turns, but the Junior T had more "punch" out of turns and a little more speed down the long back straightaway. At the 4-minute mark, the Junior T was in the lead for a win on its first time out.

All right, I'm biased; I like Team Losi products, and I like this Team Losi product in particular. This truck gets my vote for the most likely to win an A-Main anywhere, anytime!

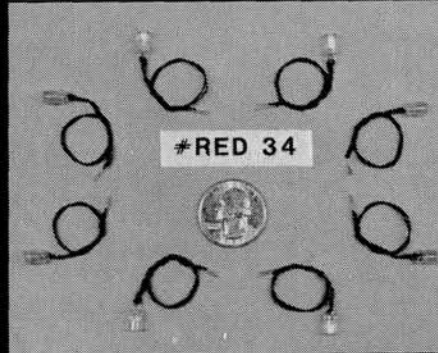
**Here's the address of the company featured in this article:*

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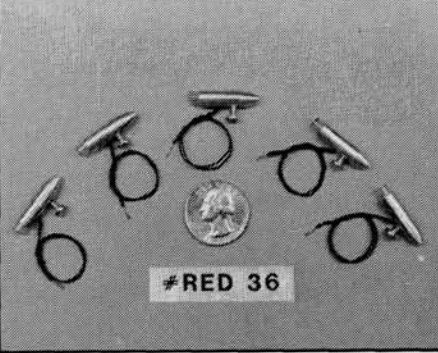
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(Continued from page 96)

and there was nothing to prevent it from vibrating and coming loose! Most diffs have a nylon or Nyloc nut that prevents such vibration, but the Tenforce had neither. I took the car home to see what I could do solve the problem. After trying several things, I found that putting Loctite* 242 on the adjustment screw, letting it dry and then assembling the diff prevented the screw from loosening during the run.

My overall impression of the Tenforce is good. It handles well, and the belt drive makes it run silently and efficiently. The diff lacks refinement, but with some work, you can get it to function properly. The only major concern I have with the car is finding a place to race it. ROAR rules forbid cars with independent suspensions to be raced in the on-road classes. As a road racer, the Tenforce has a limited future. If your local club is open-minded about independent suspension, or

(Continued on page 217)

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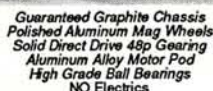
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| Sassy Clod Aluminum Chassis, Black, Blue, Gold, Clear | 79.95 |
| LOOK!! All New Black Foot Metal Gear Set | 109.95 |
| A.J.'s Scorcher Black Magic Motors: | |
| A/J's Scorchor Mod. Clod, USA-1 Hi-Speed pair 52,000 rpm. | 99.95 |
| A/J's Scorchor Monster Truck Motor 7-14 cells 52,000 rpm | 54.95 |
| New: Clod USA-1 Scorchor Modified Hi-Torque Pulling pair | 129.95 |
| New: A/J's Scorchor Modified Hi-Torque Pulling | 69.95 |
| Stock USA-1 Scorchor Pulling pair 28.00 ea. Clod pair | 18.00 |
| New: A/J's Screamor Stock 2" 45° timing | 18.00 |
| Max Trax Eliminator Truck-Pull Sled | SALE 299.95 |
| New: A/J's Foam Tire Inserts . . . Blk Ft. 9.95/cd. Clod . 12.95/cd. | |

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DRAG RACING

- | | |
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| AJ's 1/10 Pro Stock Kit | SALE 168.95 |
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| Graphite Chassis, 3 Body Styles | |
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| 24" Wheel Base, Graphite Chassis, | |
| Aluminum Wheels, Bearings, 76 mph!! | |
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| 48p Gears, Buick or Corvette Body No Electrics | |
| PDI Pro-Drag Electric S/C | 179.95 |
| Black Magic Voo-Doo 102,000 rpm | 69.95 |
| 14 cell 600 mah SCR Top Fuel Pack "awesome" | 89.95 |
| Black Magic F/C and Pro Stock Motor 82,000 rpm | 59.95 |
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| Catalog | 2.00 |

TENFORCE

(Continued from page 198)

if you want a dirt-oval racing car, try the Tenforce. You'll be surprised!

*Here are the addresses of the companies mentioned in this article:

Serpent; distributed by R/C Motorsports, 4715 NW 157 St., Miami, FL 33014.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

KO Propo; distributed by Global Hobbies Distributors, 10725 Ellis Ave., Fountain Valley, CA 92728.

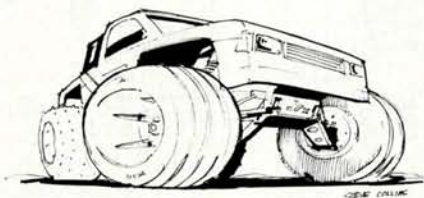
Tekin Electronics, 970 Calle Negocio, San Clemente, CA 92672.

Team Losi, 13848 Magnolia Ave., Chino, CA 91710.

Sanyo Electric, Battery Division, 200 Riser Rd., Little Ferry, NJ 07643.

Motion Graphics, 2645 Robert Arthur Rd., Westminster, MD 21157.

Loctite Corp., 4450 Cranwood Ct., Cleveland, OH 44128.



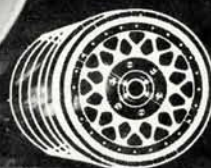
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On sale: Jan. 28, 1991

Car Action Race Space, 251 Danbury Rd., Wilton, CT 06897.

LETTERS

(Continued from page 11)

think it's a great idea, too. I really enjoy your magazine, and I read it all the time. I also want to get into R/C boats. Can you please tell me where to find some info about them?

AARON CLEMENT
Ojai, CA

Aaron, you're not alone. After seeing a ping-pong competition on ESPN one night, I knew they were running out of programming material! Although it would be great to see weekly R/C coverage, there probably wouldn't be enough support. On the other hand, large events like the Worlds and the Nationals could be universally entertaining. Maybe if everyone reading this sends a little note to ESPN, they'll see the light. As for your boat query, check out the latest issue of R/C Boat Modeler.

JH

BASEBALL AND "TECHNICAL STUFF"

I collect baseball cards, and I'm starting to like R/C cars, but I don't know the dif-

(Continued on page 226)

AUTOGRAPHICS

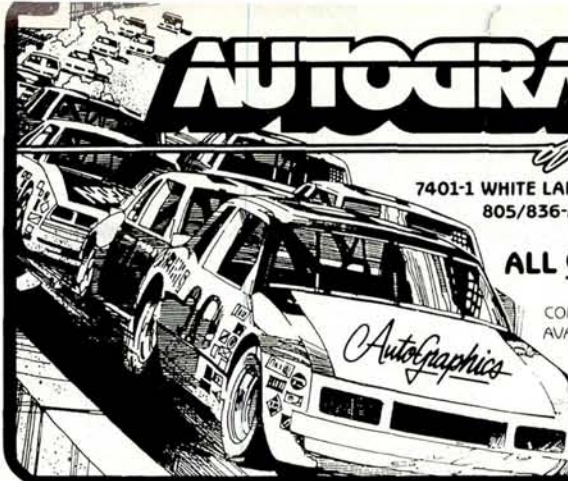
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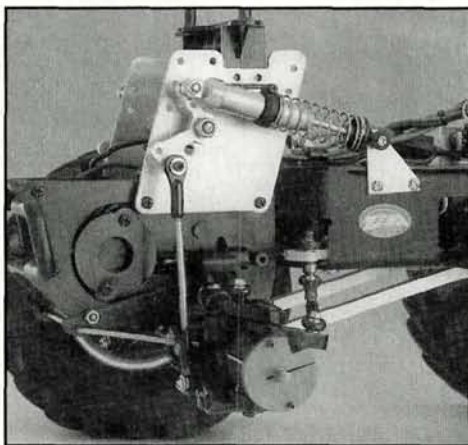
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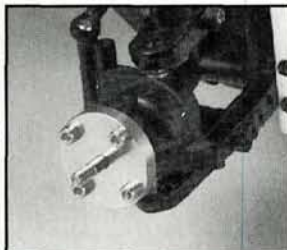
Innovative lineup of R/C truck accessories now includes USA-1 Cantilever Suspension System

Make your USA-1 perform like full-size stadium trucks.

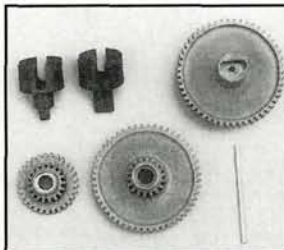
- High-tech suspension system patterned after the latest full-scale monster trucks.
- Accepts most 4" shocks (not included).
- Makes the Kyosho USA-1's handling and suspension travel even better.
- Fully adjustable—fits both stock chassis and Sassy Chassis equipped trucks.



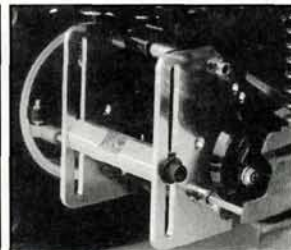
USA-1 Cantilever Suspension System



HD Aluminum Wheel Hub Set
Package of two fits front or rear wheels of USA-1 and all Kyosho monster trucks.



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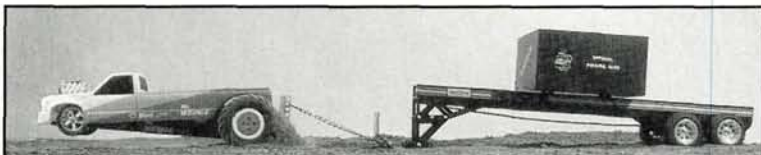


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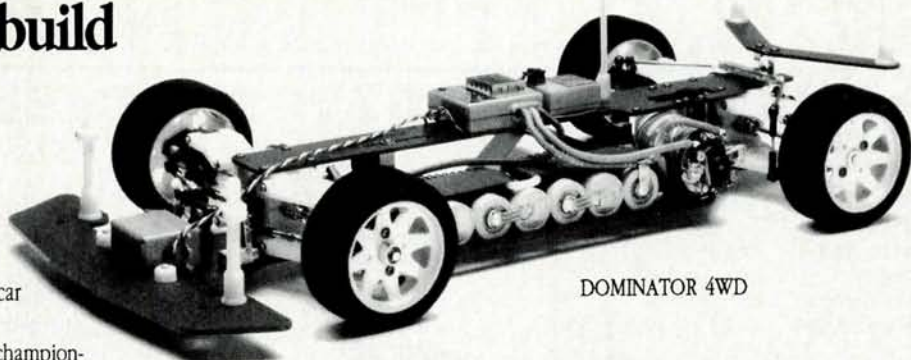
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No matter which car you drive, you get quality, performance, and durability. The most value for your money.

LETTERS

(Continued from page 219)

ference between a speed controller and an electronic speed controller, and all that technical stuff.

KRIS GIAMPA
Irvine, CA

Simply put, Kris, a speed controller is a limiting device that enables you to vary the speed at which your electric motor operates. Without a speed controller, your motor would just run at full speed until the battery dumped. There are two types of speed controllers: mechanical and electronic.

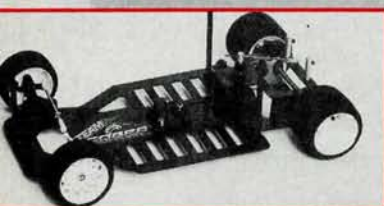
The most common mechanical speed controller is the "three step" variety that's found in most entry-level car kits. This consists of a rotary "wiper" contact that moves across several other contacts. One of these contacts is usually for reverse, and three are for forward (each controls a different forward speed). Mechanical

(Continued on page 227)

TEAM COBRA SMOKES 'EM AT THE WHIP!!!! 1991 LAKE WHIPPOORWILL U.S. OVAL MASTERS

John Broesler, TQ/Wins the A MAIN MODIFIED, wins the A MAIN STOCK!
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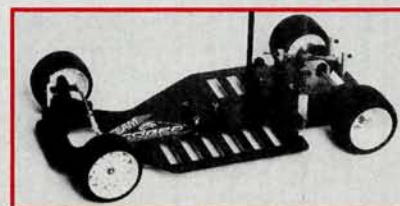
COBRA LTOOR
TQ/WINNER A MAIN MODIFIED



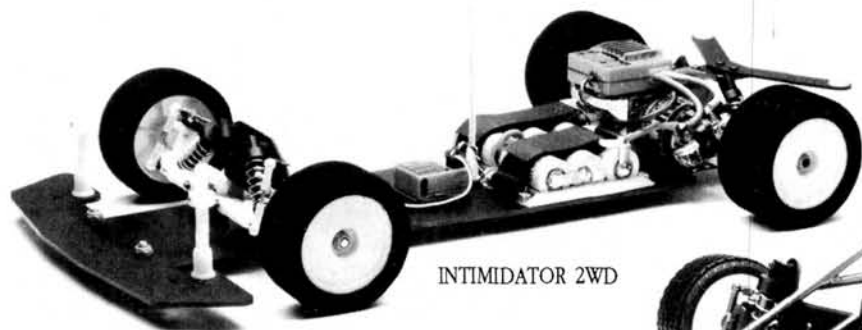
"After having owned and raced all other competitive 1/10th scale cars, I can say that nothing compares to a Cobra. It was so much smoother, faster, and easier to get dialed in, that I was immediately turning more laps than I had ever turned before."

John Broesler

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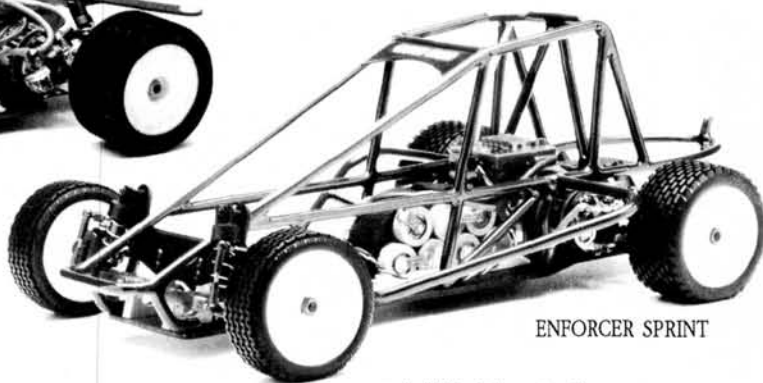
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LETTERS

speed controllers are ideal for beginners because they're simple and inexpensive.

Electronic speed controllers (ESCs) are suitable for more advanced enthusiasts and racers. Although they do the same basic jobs, the ESC is vastly more efficient than the mechanical speed controller because it uses advanced circuitry to regulate voltage, thereby wasting much less battery energy. Another of the ESC's advantages is that it has a much broader "power band" than a mechanical speed controller does, and that makes the car much easier to drive.

FM

STUCK ON STICKERS

I have one and *only* one question! I just

need to know where all the Thunderdrome racers get their miniature NASCAR racing stickers.

JEFF PESSEMIER

Tacoma, WA

Jeff, if you're referring to the NASCAR clusters, they're available from Autographics and Bolink. Simple question; simple answer!

JH

Not quite so simple, John. You didn't tell him how to get in touch with them! Of course, it takes a woman to get it right! Jeff, if your local hobby shop doesn't carry these products, contact the companies directly: Autographics of California, 7401-I White Ln., Bakersfield, CA 93309;

(805) 836-AUTO; Bolink, 420 Hosea Rd., Lawrenceville, GA 30245; (404) 963-0252.

LA

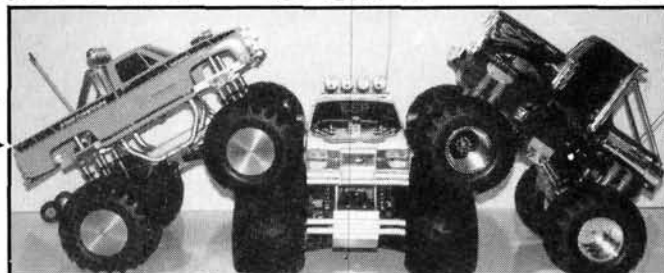
HOBBY SHOP BLUES

I'm fourteen and I live by a town that has two racetracks. Happenin' Hobbies has a well-stocked hobby shop, an indoor carpet oval, an outdoor dirt oval and an off-road track. All three owners are awesome drivers and awesome guys, and their tracks provide steady racing action. M+M Raceway is an outdoor off-road track with stadium jumps, hairpins, whoop-de-dooos and just about any other turn or jump imaginable. In the summer, I race at M+M,

(Continued on page 233)

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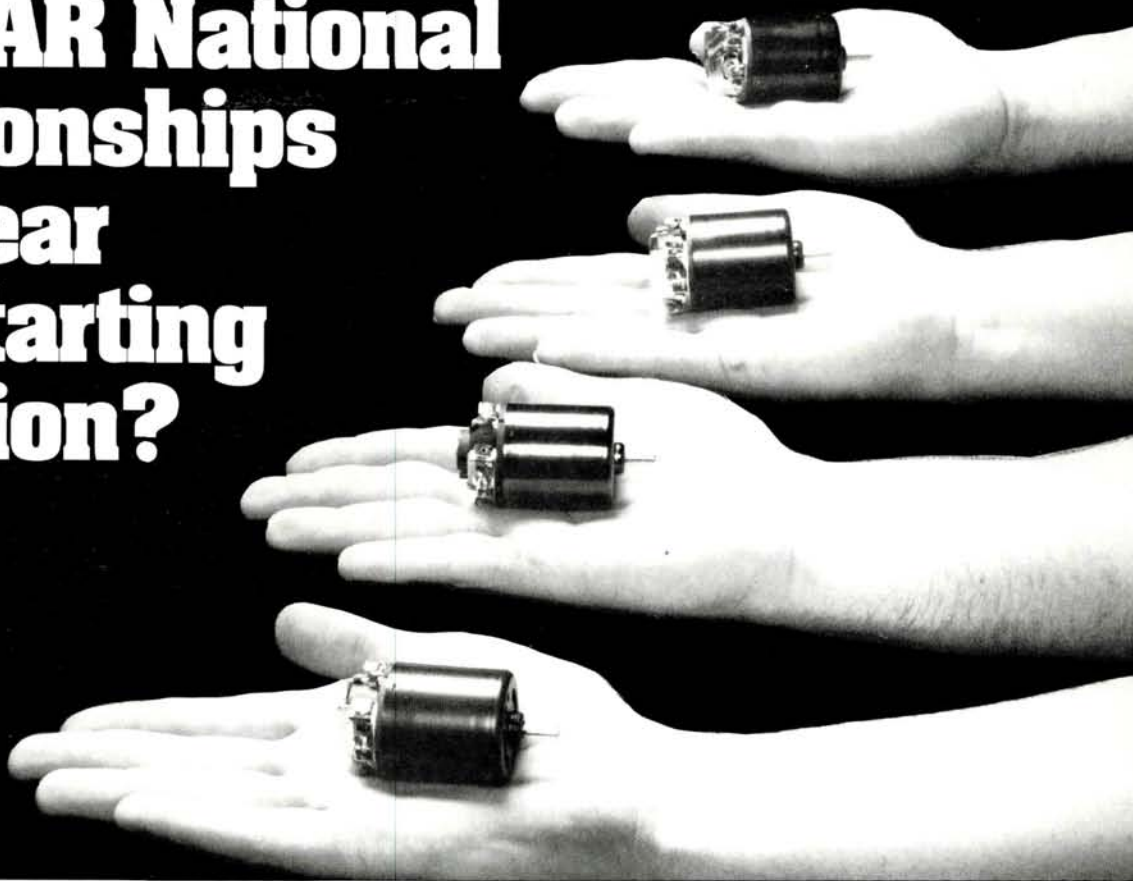
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Which Motor Manufacturer Won ROAR National Championships Every Year Since Starting Production?



LETTERS

(Continued from page 227)

but when they close I slap the foams on my RC10 and run on the carpet.

My problem is that Happenin' Hobbies is going out of business because people don't buy parts from them. I think that if the shops have the parts, then we drivers

should buy from them. When we buy from local hobby shops, we support our local economy, and we preserve our racetracks. I understand that buying new kits from places like Tower Hobbies saves a lot of money, but placing orders for springs, dogbones and small parts isn't right. I'm *not* condemning Tower Hob-

bies or any place like it, but get *real!* If you support your local hobby shop, then they'll always be there for you. Please print my letter so that things like this won't happen again.

RANDY SAMS
Fremont, IA

(Continued on page 235)

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Happy Holidays!

LETTERS

(Continued from page 233)

Randy, people have two choices when it comes to buying their kits: they can order them from one of the multitude of mail-order companies, or they can spend a few dollars more and buy them at the local hobby shop. What most people don't real-

ize is that those few extra bucks they spend at the hobby shop go toward paying its overhead. Having a hobby shop in the area is more than just a convenience; it's a necessity. Where else would you go when you needed some wire, paint, or body clips, or anything, for that matter? Don't think that I'm biased against mail-order houses (they help to keep the prices

of kits down by competing with the hobby shops), but don't let what happened in Randy's town happen in yours. AS

RUN FOR THE HONOR

I've just re-entered the wonderful world of R/C racing. While I was in the army, I was stationed in South Korea for a year

(Continued on page 238)

PEAK PERFORMANCE.



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290-294	30.95	36.95
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HI-VOLTAGE (stock racing)	59.95	69.95



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LETTERS

(Continued from page 235)

and a half, and my major pastime over there was R/C cars and trucks. My company formed teams and competed against other companies. The races were mainly for "bragging rights" but, occasionally, there was a trophy or a cash purse. We took our "sport" very seriously, but it seems like child's play compared with what has been happening in this country. I can't believe it.

I'd like to join ROAR or NORRCA so that I can participate in the many events held throughout the country, but I don't know how. Also, I'd like to get copies of both organizations' rules. Any help you can give me would be greatly appreciated. Your magazine is the most impressive and the most informative magazine on the market—bar none. Keep up the outstanding work.

JAMES ARNOLD JR.
Douglasville, GA

(Continued on page 240)

VARIABLE LOAD TESTING -- NOW AVAILABLE!

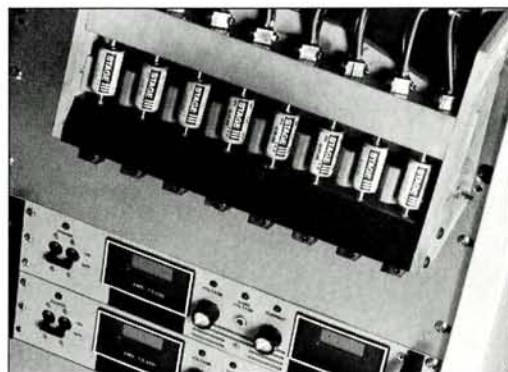
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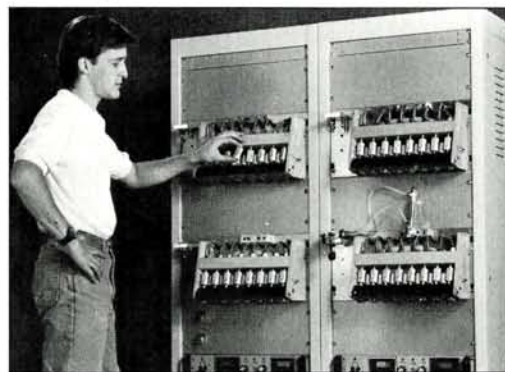
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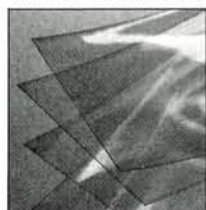
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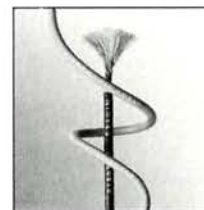
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LETTERS

(Continued from page 238)

Thank you, James. You can reach ROAR
by writing 288 East Maple, Ste. 266,
Birmingham, MI 48011; phone: (313)
644-0669; fax: (313) 644-0608.
NORRCA's address is 331 Mariposa Ct.,
Upland, CA 91786; phone: (714) 981-
9641; fax: (714) 981-0527. LA

ACTION CAT?

I'm the proud owner of a Schumacher
Cougar, and I subscribed to the *Action
Series* after I read a Track Report on it in
one of the issues. I've almost gone insane
trying to find the extra bearings men-
tioned in that article. I'm also looking for
the saddle-pack holder, a replacement
body and a CompositeCraft long front
shock mount. I've called everywhere
without any luck! Where can I find this
stuff?

MATT GUILLEBAUD
Albuquerque, NM

Have you tried to contact the companies
directly, Matt? Give Schumacher a call
at (813) 889-9691, or write to 6302 Ben-
jamin Rd., Ste. 404, Tampa, FL 33634.
Schumacher's fax number is (813) 889-
9593. CompositeCraft's phone number is
(407) 351-3432, and the address is 5885
Lake Hurst Dr., Orlando, FL 32819. You
could also try Cats West, 635 Lassen Ln.,
Ste. 140, Mt. Shasta, CA 96067; (916)
926-6011. Good luck! LA



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